

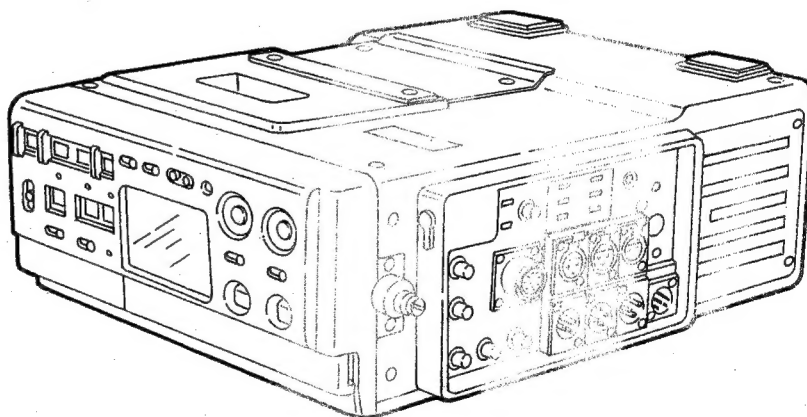
Panasonic



PORTABLE DIGITAL CASSETTE RECORDER

AJ-D320 ^P_E

Operating Instructions & Service Manual



Broadcast Systems

INTRODUCTION

This Service Manual contains all operation and technical information for use and service of the Panasonic 1/2" Digital Portable VTR model AJ-D320.

PORTABLE DIGITAL CASSETTE RECORDER

AJ-D320

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Section 1. Operating Instruction

Section 2. Maintenance & Mechanical Adjustment

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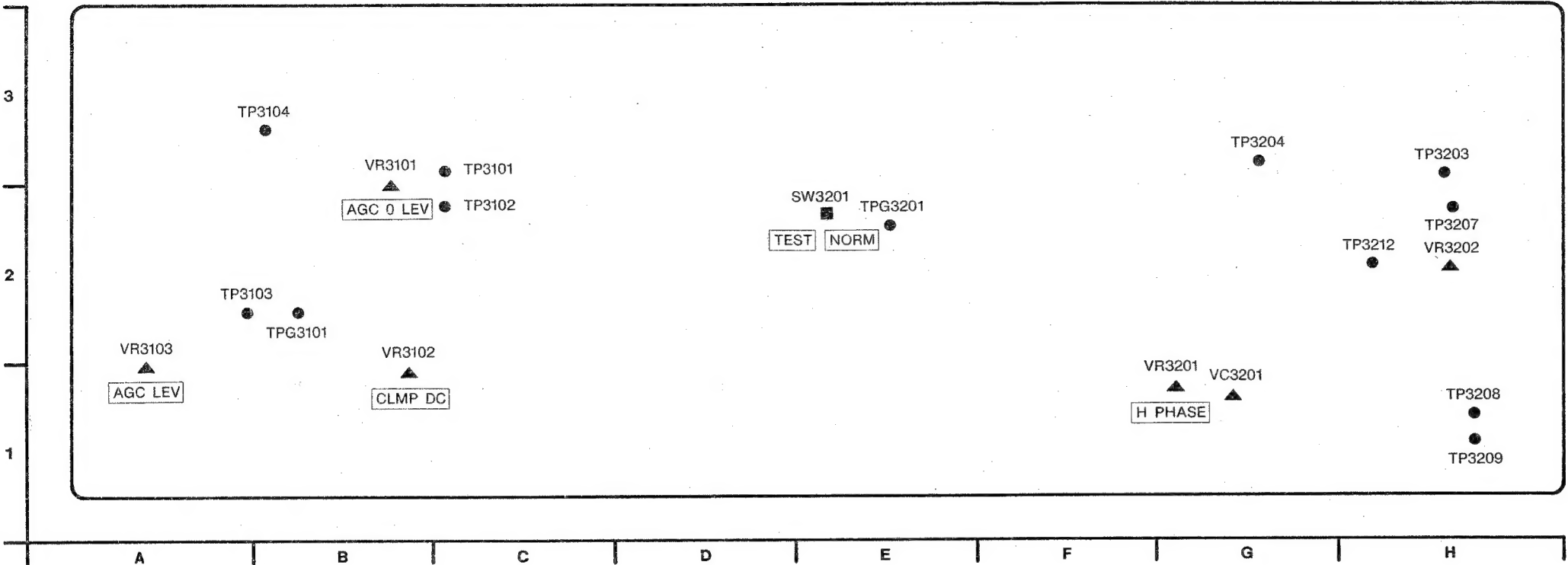
(1) Block Diagrams

(2) Schematic Diagrams

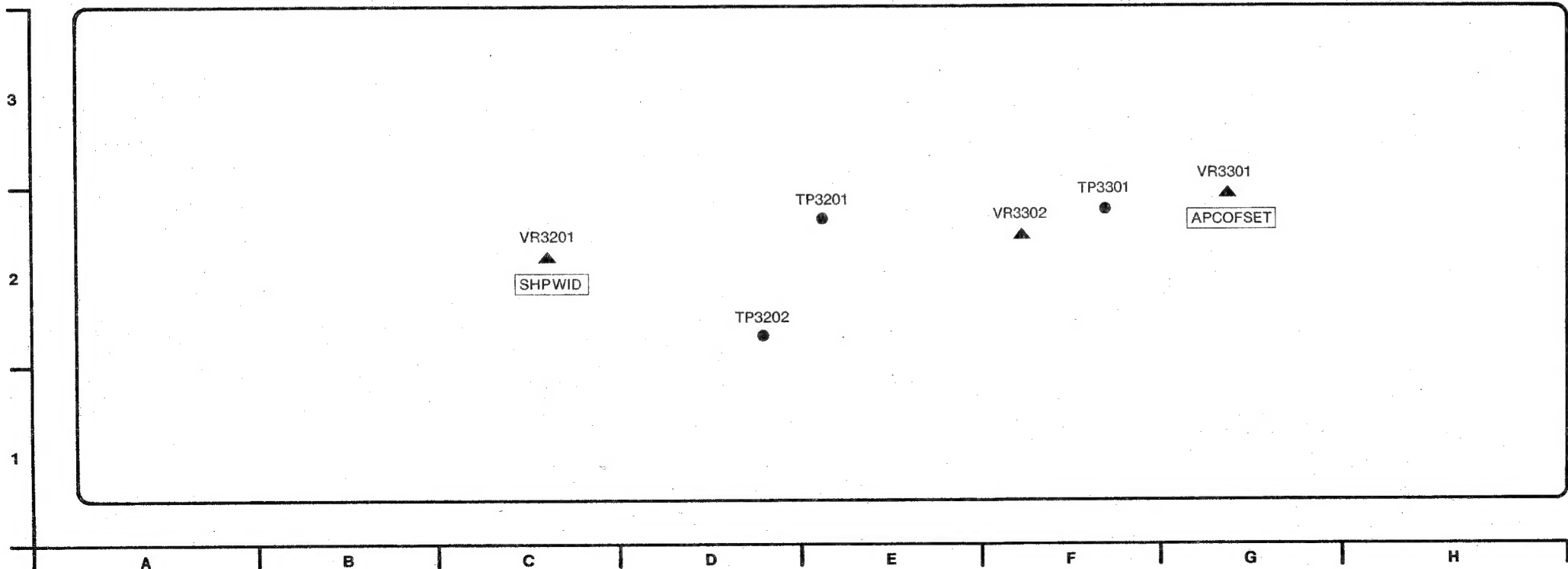
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Section 4. Electrical Parts List

VIDEO A/D PLL P.C.BOARD



VIDEO NSTD P.C.BOARD



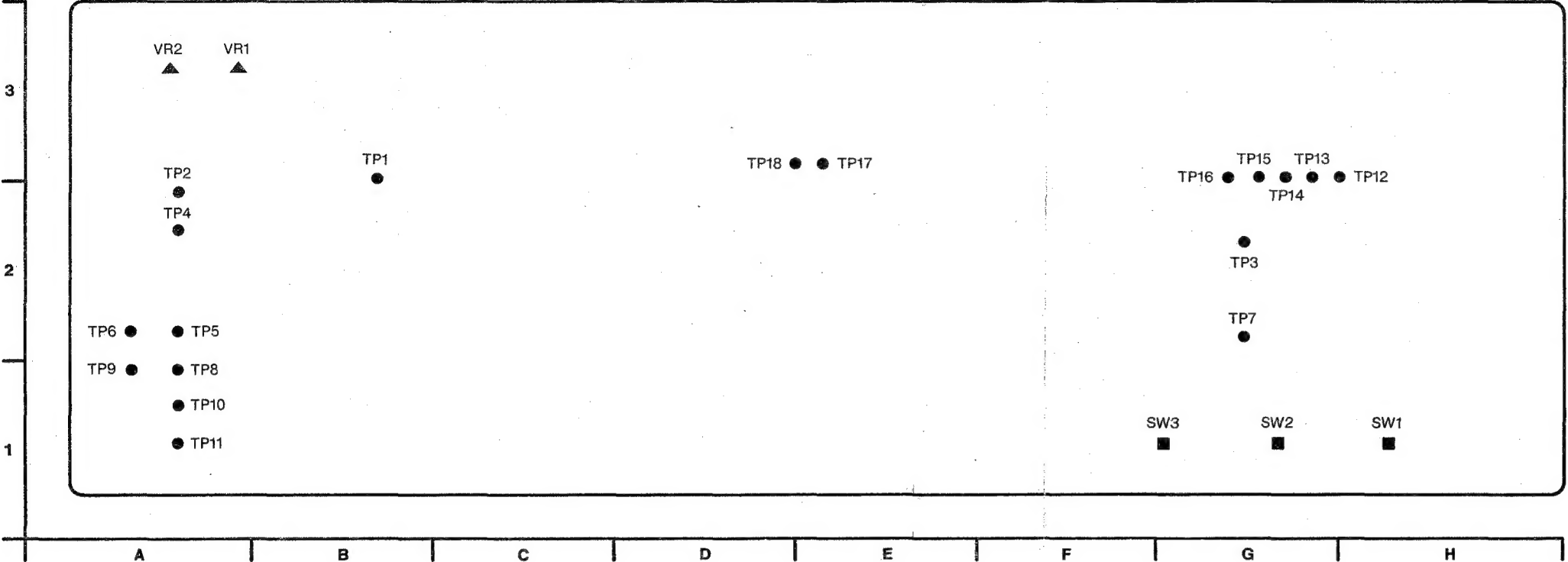
AUDIO A/D
P.C. BOARD

COMPONENT SIDE	
TEST POINT	
TP3101	C-3
TP3102	C-2
TP3103	A-2
TP3104	B-3
TP3203	H-3
TP3204	G-3
TP3207	H-2
TP3208	H-1
TP3209	H-1
TP3212	H-2
TPG3101	B-2
TPG3201	E-2
ADJUSTMENT	
VR3101	B-2
VR3102	B-1
VR3103	A-1
VR3201	G-1
VR3202	H-2
VC3201	G-1
SWITCH	
SW3201	E-2

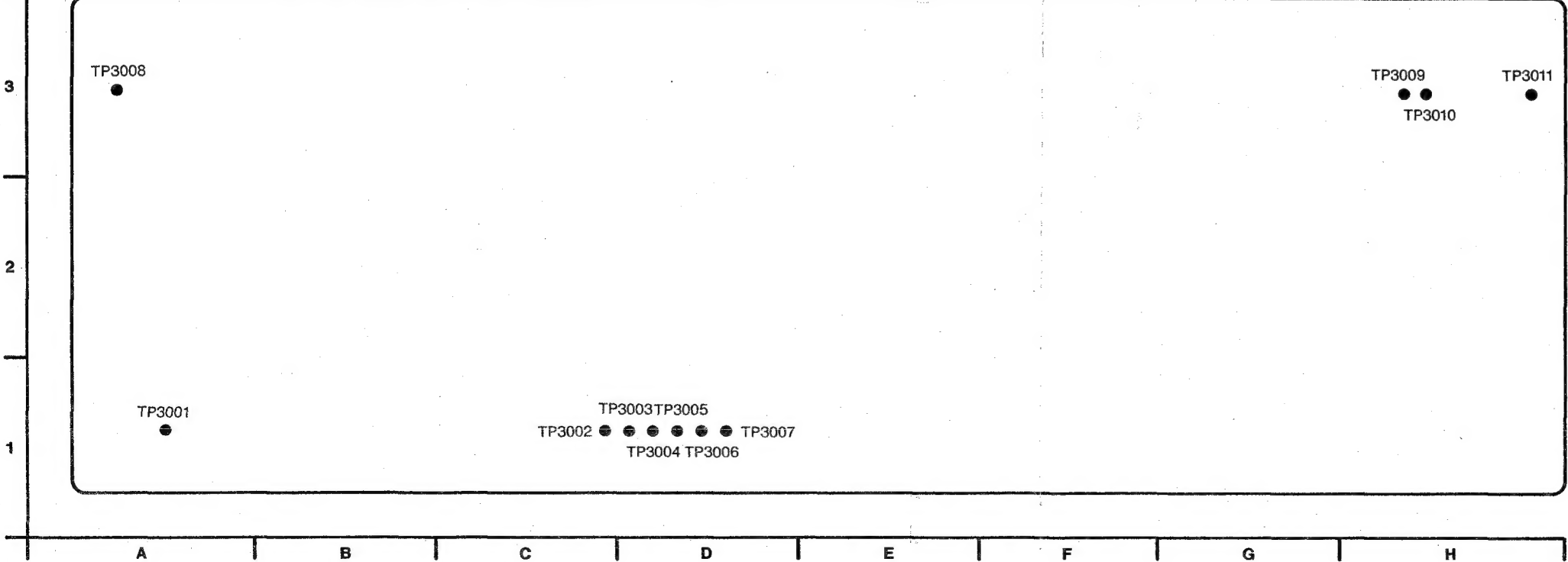
VIDEO NSTD
P.C. BOARD

COMPONENT SIDE	
TEST POINT	
TP3201	E-2
TP3202	D-2
TP3301	F-2
ADJUSTMENT	
VR3201	C-2
VR3301	G-2
VR3302	F-2

SERIAL I/F V P.C.BOARD



VIDEO REC MEMORY P.C.BOARD



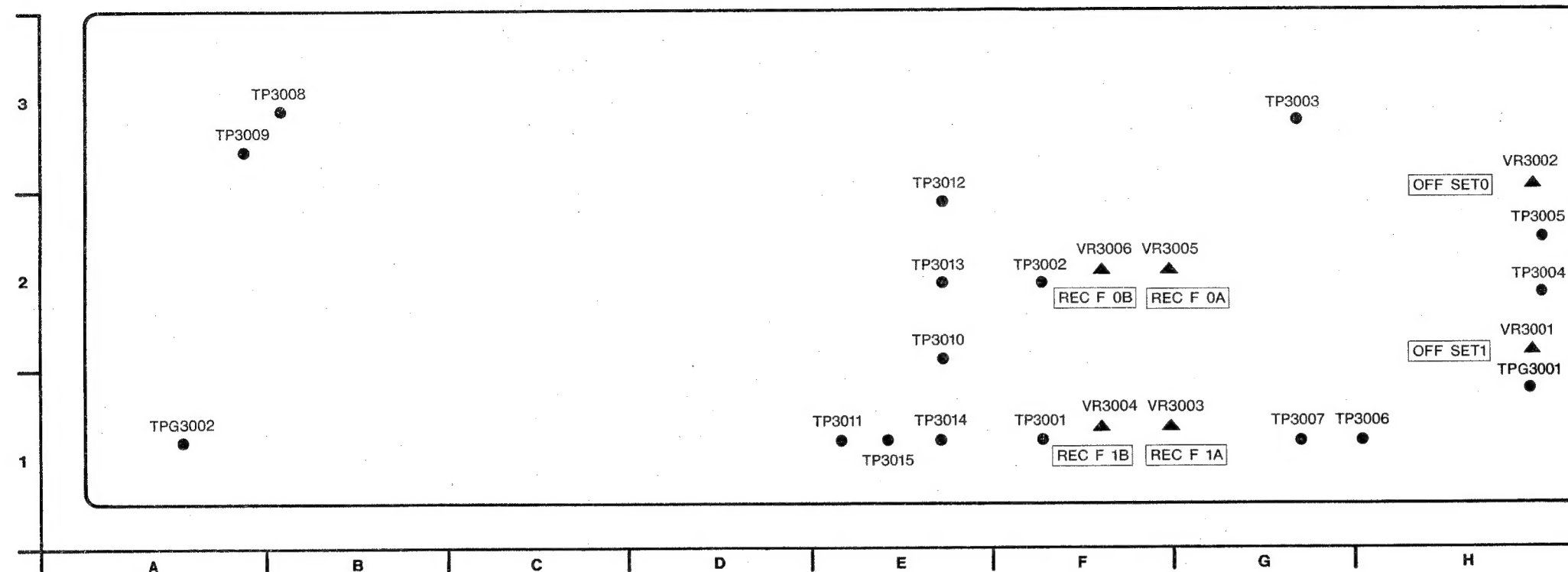
SERIAL I/F V
P.C. BOARD

COMPONENT SIDE	
TEST POINT	
TP1	B-3
TP2	A-2
TP3	G-2
TP4	A-2
TP5	A-2
TP6	A-2
TP7	G-2
TP8	A-1
TP9	A-1
TP10	A-1
TP11	A-1
TP12	G-3
TP13	G-3
TP14	G-3
TP15	G-3
TP16	G-3
TP17	E-3
TP18	E-3
ADJUSTMENT	
VR1	A-3
VR2	A-3
SWITCH	
SW1	H-1
SW2	G-1
SW3	G-1

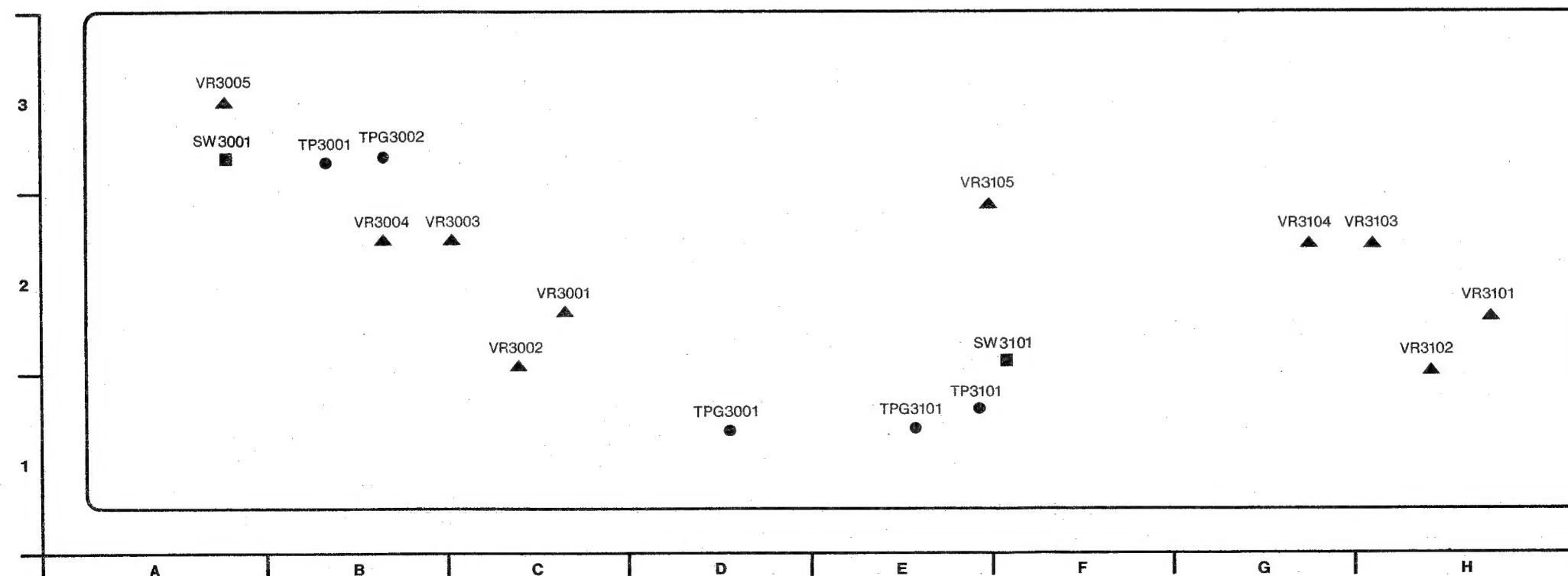
VIDEO REC MEMORY
P.C. BOARD

COMPONENT SIDE	
TEST POINT	
TP3001	A-1
TP3002	C-1
TP3003	D-1
TP3004	D-1
TP3005	D-1
TP3006	D-1
TP3007	D-1
TP3008	A-3
TP3009	H-3
TP3010	H-3
TP3011	H-3

VIDEO PS BUFFER P.C.BOARD



EQUALIZER P.C.BOARD



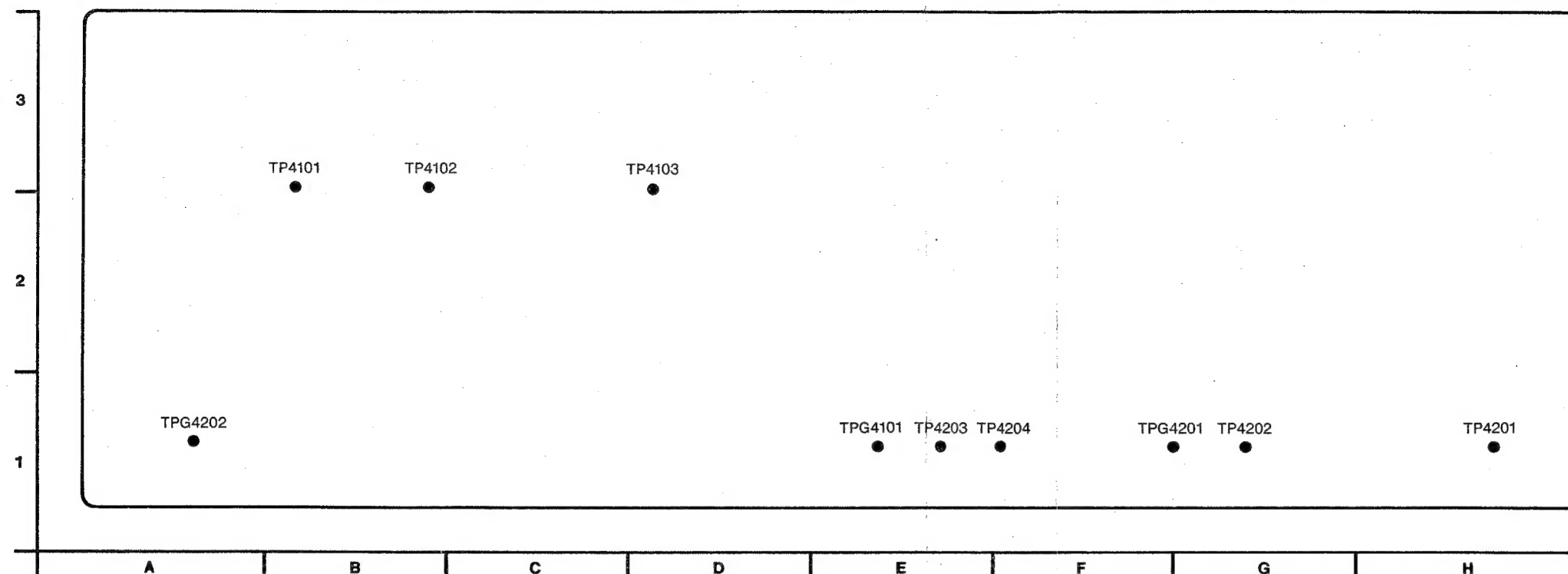
VIDEO PS P.C. BOARD

COMPONENT SIDE	
TEST POINT	
TP3001	F-1
TP3002	F-2
TP3003	G-3
TP3004	H-2
TP3005	H-2
TP3006	H-1
TP3007	G-1
TP3008	B-3
TP3009	A-3
TP3010	E-2
TP3011	E-1
TP3012	E-2
TP3013	E-2
TP3014	E-1
TP3015	E-1
TPG3001	H-1
TPG3002	A-1
ADJUSTMENT	
VR3001	H-1
VR3002	H-2
VR3003	F-1
VR3004	F-1
VR3005	F-2
VR3006	F-2

EQUALIZER P.C. BOARD

COMPONENT SIDE	
TEST POINT	
TP3001	B-3
TP3101	E-1
TPG3001	D-1
TPG3002	B-3
TPG3101	E-1
ADJUSTMENT	
VR3001	C-2
VR3002	C-2
VR3003	B-2
VR3004	B-2
VR3005	A-3
VR3101	H-2
VR3102	H-2
VR3103	H-2
VR3104	G-2
VR3105	E-2
SWITCH	
SW3001	A-3
SW3101	F-2

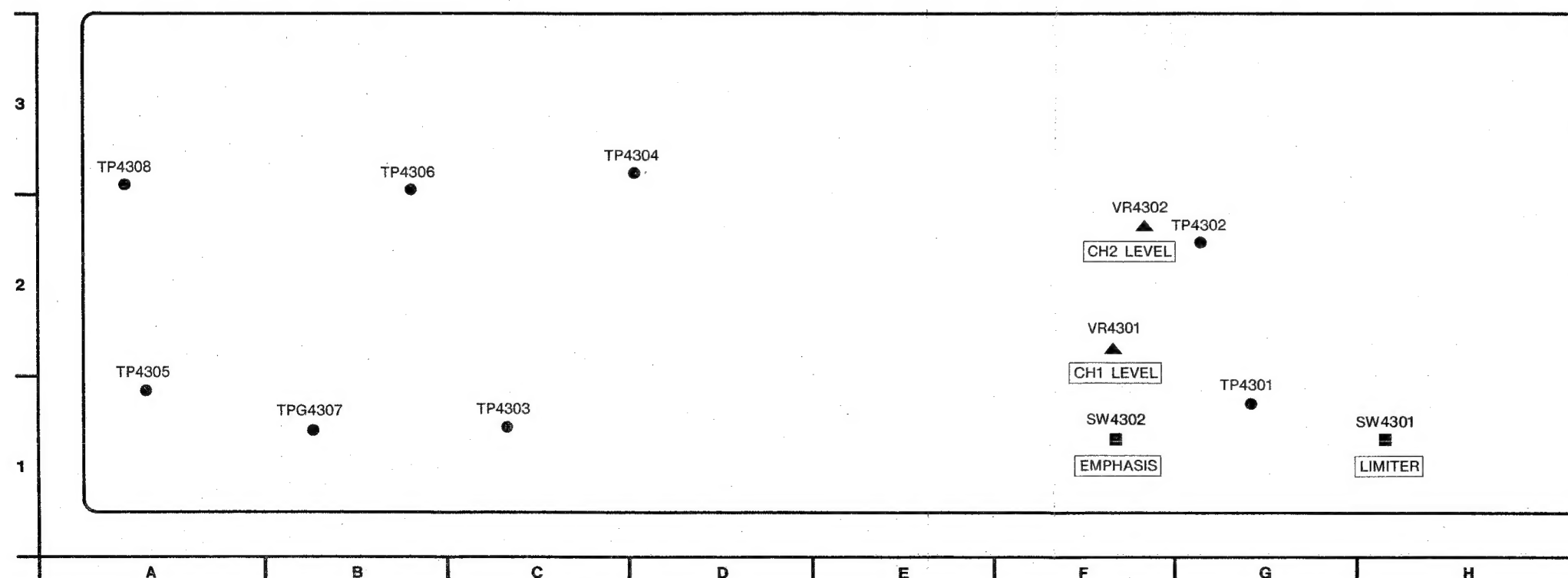
AUDIO REC P.C.BOARD



AUDIO REC P.C. BOARD

COMPONENT SIDE	
TEST POINT	
TP4101	B-3
TP4102	B-3
TP4103	D-3
TP4201	H-1
TP4202	G-1
TP4203	E-1
TP4204	F-1
TPG4101	E-1
TPG4201	G-1
TPG4202	A-1

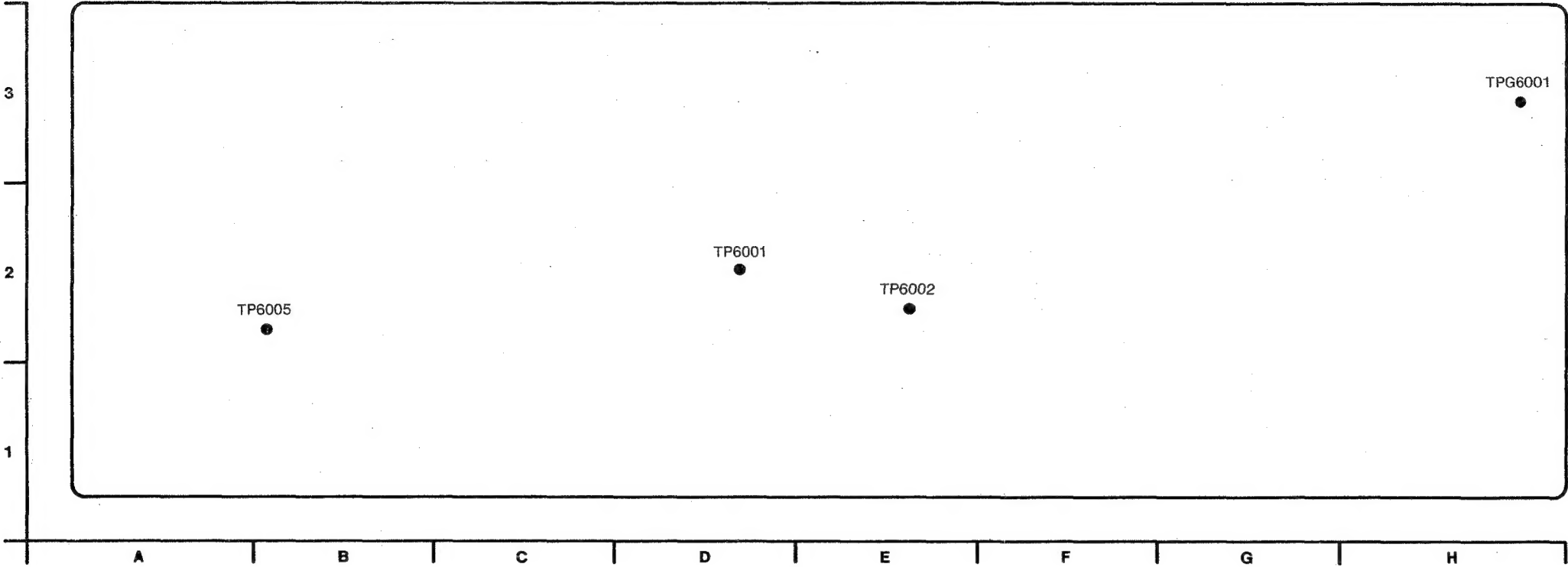
AUDIO A/D P.C.BOARD



VIDEO A/D PLL P.C. BOARD

COMPONENT SIDE	
TEST POINT	
TP4301	G-1
TP4302	G-2
TP4303	C-1
TP4304	D-3
TP4305	A-1
TP4306	B-3
TP4308	A-3
TPG4307	B-1
ADJUSTMENT	
VR4301	F-2
VR4302	F-2
SWITCH	
SW4301	H-1
SW4302	F-1

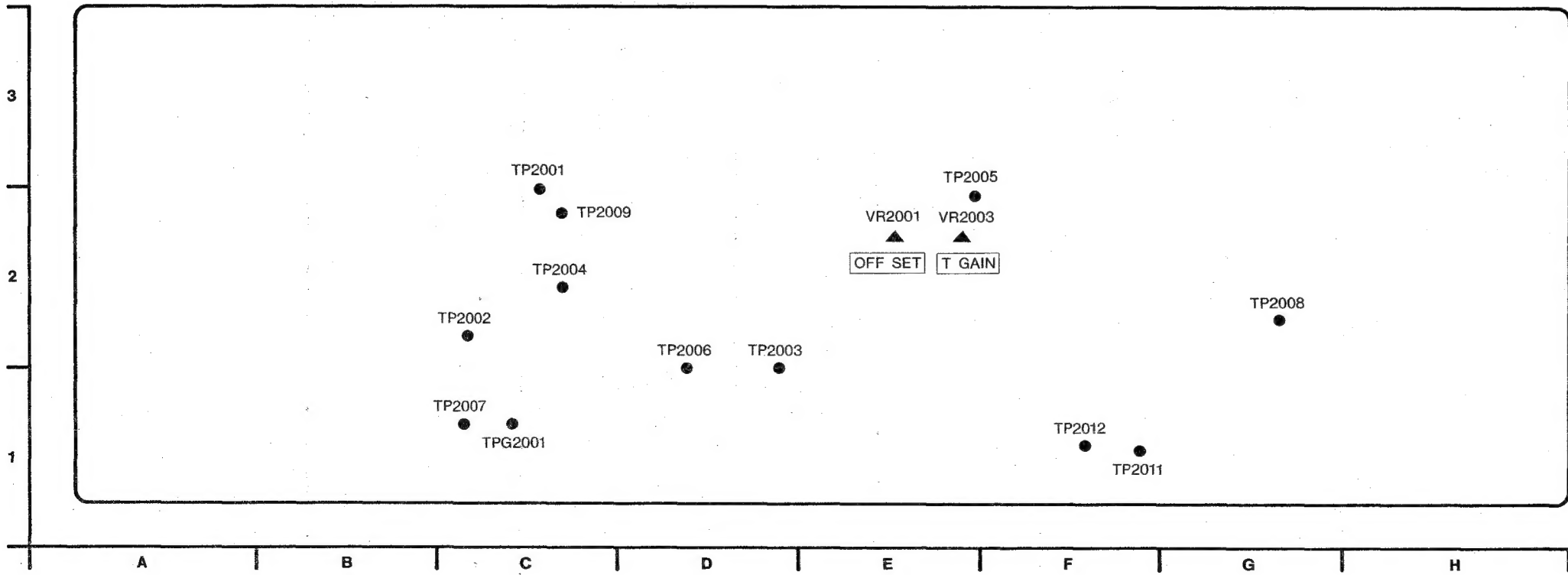
SYSTEM CONTROL P.C.BOARD



SYSTEM CONTROL
P.C. BOARD

COMPONENT SIDE	
TEST POINT	
TP6001	D-2
TP6002	E-2
TP6005	B-2
TPG6001	H-3
TP6003	FOIL SIDE
TP6004	FOIL SIDE

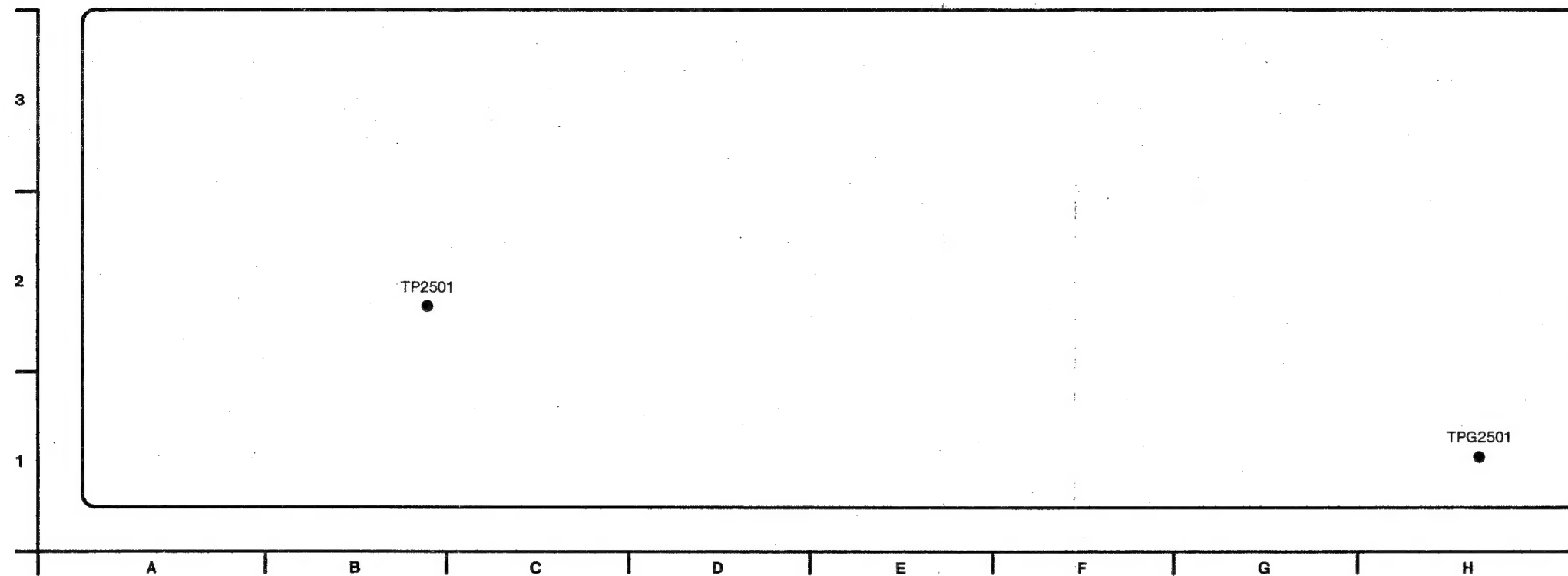
SERVO 1 P.C.BOARD



SERVO 1 P.C. BOARD

COMPONENT SIDE	
TEST POINT	
TP2001	C-2
TP2002	C-2
TP2003	D-1
TP2004	C-2
TP2005	E-2
TP2006	D-1
TP2007	C-1
TP2008	G-2
TP2009	C-2
TP2011	F-1
TP2012	F-1
TPG2001	C-1
ADJUSTMENT	
VR2001	E-2
VR2002	E-2

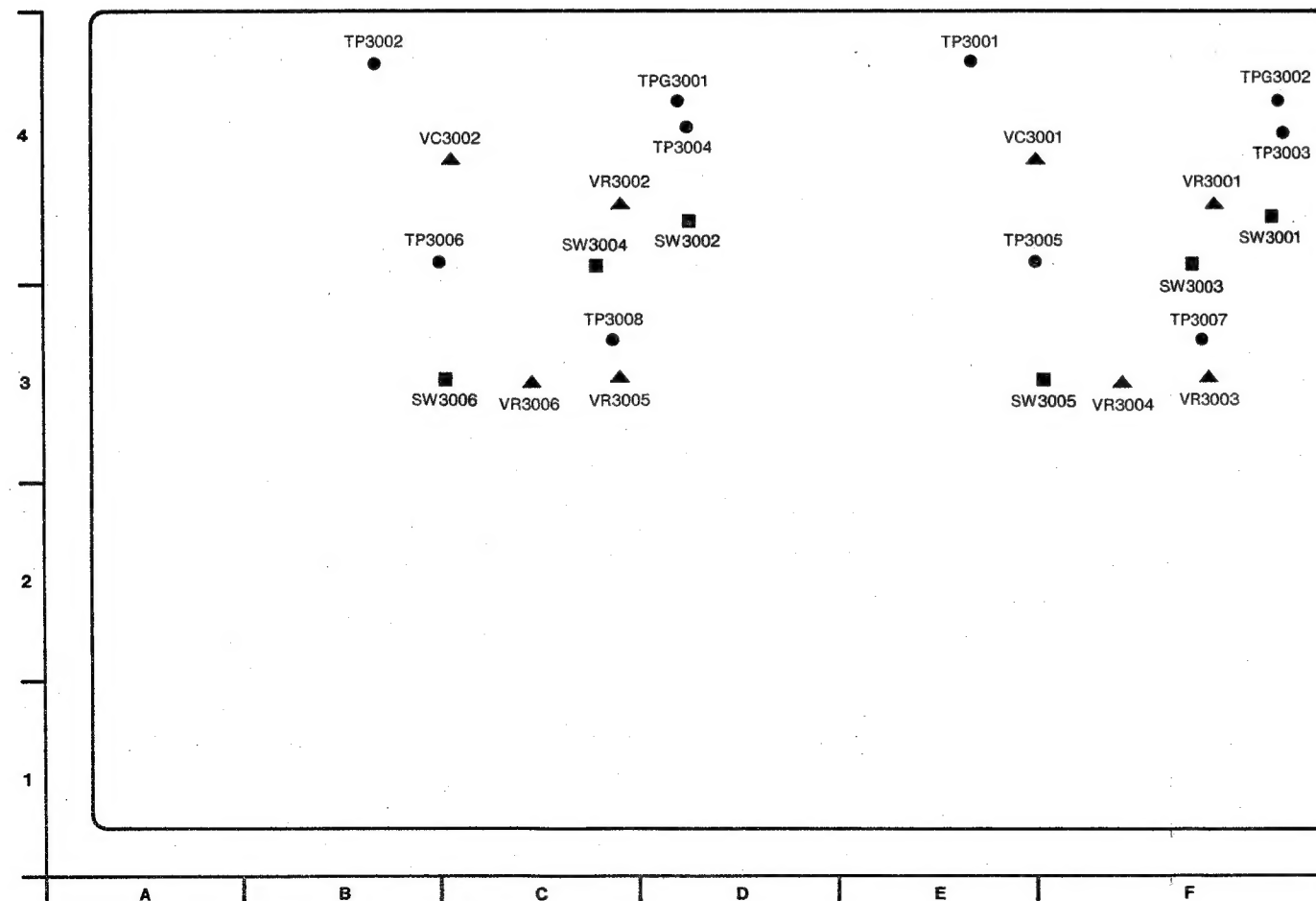
SERVO 2 P.C.BOARD



SERVO 2 P.C. BOARD

COMPONENT SIDE	
TEST POINT	
TP2501	B-2
TPG2501	H-1

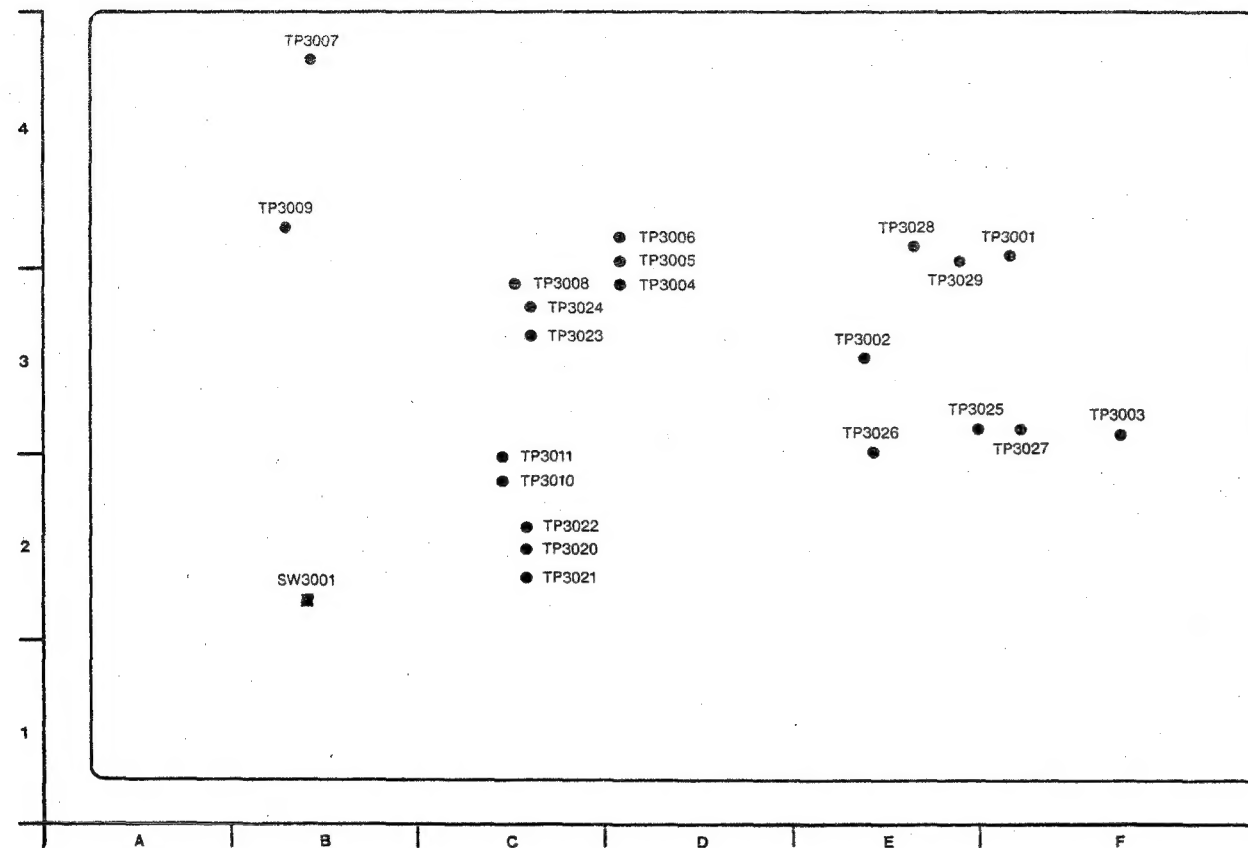
PB 0 P.C.BOARD



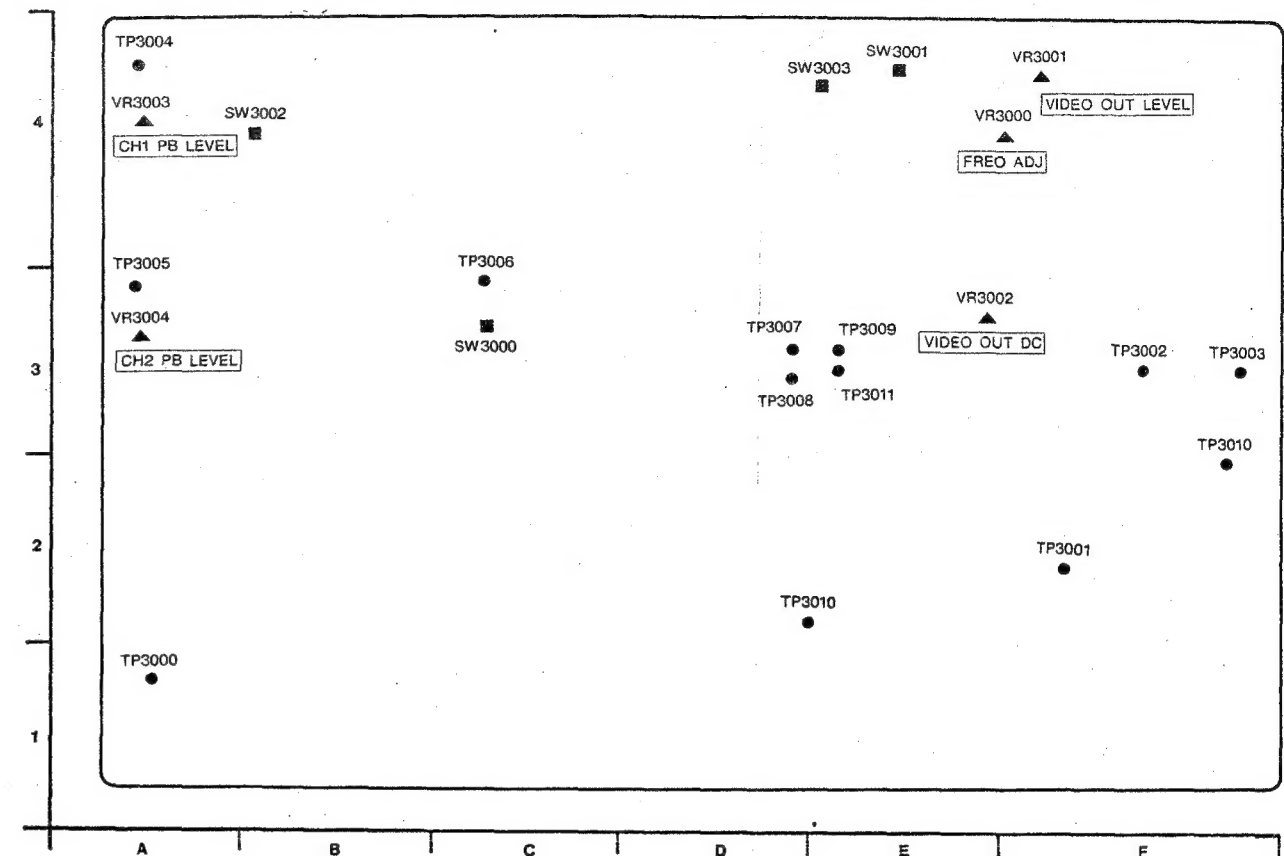
PB0 P.C. BOARD

COMPONENT SIDE			
TEST POINT		SWITCH	
TP3001	E-4	SW3001	F-4
TP3002	B-4	SW3002	D-4
TP3003	F-4	SW3003	F-4
TP3004	D-4	SW3004	C-4
TP3005	E-4	SW3005	F-3
TP3006	B-4	SW3006	C-3
TP3007	F-3		
TP3008	C-3		
TPG3001		D-4	
TPG3002		F-4	
ADJUSTMENT			
VR3001	F-4		
VR3002	C-4		
VR3003	F-3		
VR3004	F-3		
VR3005	C-3		
VR3006	C-3		
VC3001	E-4		
VC3002	C-4		

PB 1 P.C.BOARD



PB 2 P.C.BOARD



PB1 P.C. BOARD

COMPONENT SIDE			
TEST POINT		SWITCH	
TP3001	F-4	SW3001	B-2
TP3002	E-3		
TP3003	F-3		
TP3004	D-3		
TP3005	D-4		
TP3006	D-4		
TP3007	B-4		
TP3008	C-3		
TP3009	B-4		
TP3010	C-2		
TP3011	C-2		
TP3020	C-2		
TP3021	C-2		
TP3022	C-2		
TP3023	C-3		
TP3024	C-3		
TP3025	E-3		
TP3026	E-3		
TP3027	F-3		
TP3028	E-4		
TP3029	E-4		

PB2 P.C. BOARD

COMPONENT SIDE			
TEST POINT		SWITCH	
TP3000	F-3	SW3000	C-3
TP3001	F-3	SW3001	E-4
TP3002	F-3	SW3002	B-4
TP3003	A-4	SW3003	E-4
TP3004	A-3		
TP3005	C-3		
TP3006	D-3		
TP3007	D-3		
TP3008	E-3		
TP3009	E-2		
TP3010	E-3		
TP3011			
ADJUSTMENT			
VR3000	E-4		
VR3001	E-4		
VR3002	E-3		
VR3003	A-4		
VR3004	A-3		

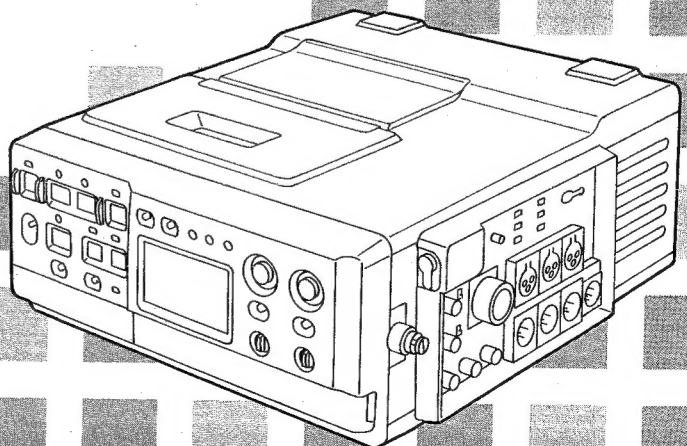
Panasonic[®]

1/2" DIGITAL

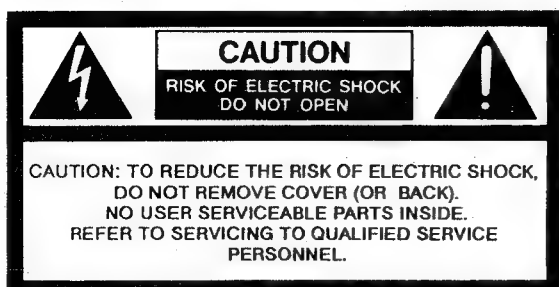
Portable Digital Cassette Recorder

AJ-**D320**^P_E

Operating Instructions



For U.S.A.



The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (service) instructions in the literature accompanying the appliance.

CAUTION: To reduce the risk of fire or shock hazard and annoying interference, use the recommended accessories only.

WARNING:

To reduce the risk of fire or shock hazard, do not expose this equipment to rain or moisture.

FCC NOTE:

This device complies with Part 15 of the FCC Rules. To assure continued compliance follow the attached installation instructions and do not make any unauthorized modifications.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

For Canada

CANADA ONLY/CANADA SEULEMENT

Caution: This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Attention: L'interférence radioélectrique générée par cet appareil numérique de type A ne dépasse pas les limites énoncées dans le Règlement sur les perturbations radioélectriques, section appareil numérique, du Ministère des Communications.

For Europe

■ DO NOT REMOVE PANEL COVER BY UN-SCREWING.

To reduce the risk of the electric shock, do not remove cover. No user serviceable parts inside. Refer servicing to qualified service personnel.

CAUTION: To reduce the risk of fire or shock hazard and annoying interference, use the recommended accessories only.

WARNING:

To reduce the risk of fire or shock hazard, do not expose this equipment to rain or moisture.

Remark:

- This apparatus was produced to BS 800.
- Dieses Modell entspricht der EG-Vorschrift (für Funkstörungsschutz) 87/308/EWG.
- La Société PANASONIC-FRANCE, importateur du matériel MATSUSHITA-JAPON déclare que cet appareil est conforme aux prescriptions de la directive 76/889/C.E.E. modifiée par la directive 87/308/C.E.E.
- Dit model is onderworpen aan de EEG-richtlijn (ter voorkoming van radio-interferentie) 87/308/EEG.
- Denne model opfylder EF direktiv 87/308/EF (for forebyggelse af radiointerferens).
- La Società PANASONIC ITALIA S.p.A., importatrice di questo prodotto, dichiara che questo apparecchio è conforme alle disposizioni della direttiva C.E.E./87/308 (D.M. 13.4.1989).
- Este modelo cumple con la norma EC (para interferencias de radio 87/308/ECC).

is the safety information.

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Features

1

Outline

High Picture and Sound Quality

Even in camera systems currently in use, the unit can be connected using a 26-pin cable (SMPTE standards) to record images using digital signals yielding a high picture quality. In addition, a 4-channel PCM recording system has been selected for the sound to obtain a high sound quality. (The sound in CH1/3 and CH2/4 is respectively the same.)

Compact Size and Light Weight

The unit's compact size of 315 (W)×138 (H)×393 (D) mm [$12\frac{7}{16}$ "× $5\frac{7}{16}$ "× $15\frac{1}{2}$ "] and its light weight of 7.7 kg (16.9 lbs) makes it easy to carry around and use outdoors.

Full Range of VTR Operations Provided

Despite its small size, the unit offers a full range of VTR operations including stop, playback, fast forward, rewind, recording and still-picture/pause. It also comes with a simultaneous playback function and a recording review function which enables recordings to be checked speedily.

- Fast forwarding and rewinding at 16 times normal tape speed (search playback)
- Search operations at 5 times normal tape speed

Smooth Frame-to-Frame Continuity

Back space editing is performed where recordings are joined together so as to ensure smooth frame-to-frame continuity.

Built-in TCG/TCR

The unit contains its own time code generator (TCG) and time code reader (TCR). Furthermore, the vertical interval time code (VITC) can be recorded simultaneously with the video signals.

Time Code Slave Lock

The built-in time code generator (slave) can be locked to an external reference time code generator (master).

Error Correction Function

This unit features a D-3 format error correction function. Any errors generated in the digital signals due to marks or dirt on the tape are corrected by this function. Errors which this function cannot correct are compensated for by the error compensation circuit. These functions help to ensure virtually error-free playback.

Complete Compatibility With Studio Units

Cassettes recorded using this unit can be played back as they are on the AJ-D350 digital studio VTR. The high performance of the D-3 half-inch digital VTR can be put to maximum use without the need for format conversion from shooting to editing.

Recording Review Function

This function makes it possible to automatically playback the last few seconds of a recording. This comes in handy for checking what was last recorded.

Up To 64 Minutes of Recording

This unit uses only S cassettes, and it has a maximum recording time of 64 minutes.

Max. 50 minutes when the AJ-TD46S tape is used.

Max. 64 minutes when the AJ-TD60S tape is used.

Menu Functions

The unit has two menu modes.

- SET menu mode
The functions, time codes, etc. are set on this menu.
- DIAG menu mode
This is the unit's self-diagnosis menu.

Others

- Audio level bar graph, time code, warning displays
- Built-in power supply for phantom microphone
- Automatic head cleaning function
- Input of composite digital serial signals
- Operation with two batteries (AU-PB402 or Anton Bauer's COMPAC MAGNUM 13/14)

*COMPAC MAGNUM 13/14 is a registered trademark of Anton Bauer.

Specifications

Power Requirements

Power Supply: [NTSC]
DC 12 V (11~17 V)
Power Consumption: Max. 57 W

48 W: In PLAY mode
34 W*: In SAVE REC mode
57 W*: In CONFIRM mode

Power Supply: [PAL]
DC 12 V (11~17 V)
Power Consumption: Max. 58 W

50 W: In PLAY mode
35 W*: In SAVE REC mode
58 W*: In CONFIRM mode

The asterisk (*) denotes values for digital inputs. The power consumption is reduced by about 4 W for analog inputs.

— is the safety information.

General

Operating temperature:
Operating humidity:
Weight (main unit only):
Dimensions (W×D×H):
Recording format:
Recording tracks:

0°C to 40°C (32°F to 104°F)
Less than 85%
7.7 kg (16.9 lbs)
315×393×138 mm (12⁷/₁₆"×15¹/₂"×5⁷/₁₆")
Half-inch, digital D-3
Digital video, digital audio (4 channels): 6 tracks/field (NTSC),
8 tracks/field (PAL),

Tape speed:
Relative recording speed:
Recording time:
Tape:
Fast forward/rewind time:
Continuity accuracy:
Continuity time:
Loading time:
Error correction function:

Time code: 1 track, CTL: 1 track
83.88 mm/sec.
23.4 m/sec. (NTSC), 23.79 m/sec. (PAL)
Max. 64 minutes (using AJ-TD60S cassette)
Half-inch D3 metal cassette tape (1,500 Oe)
Less than 4 minutes (using AJ-TD46S cassette)
Within 2 frames
Within 0.7 sec. (2F mode), within 1.2 sec. (4F/8F mode)
Less than 5 sec.
Inner/Outer error correction or compensation

Video System

(based on standard playback machine)

Sampling frequency:
Quantizing:

NTSC: 14.3 MHz (4 fsc), PAL: 17.7 MHz (4 fsc)

NTSC: 8 bits, I/Q axis linear quantizing

PAL: 8 bits, ±135° linear quantizing

New 8-14 system

Channel coding:

NTSC: 30 Hz~5.2 MHz (±0.5 dB), 6.0 MHz (+0/-3 dB)

PAL: 25 Hz~6.0 MHz (±0.5 dB), 7.0 MHz (+0/-3 dB)

Video band:

52 dB

S/N ratio:

Less than 3%

Differential gain:

Less than 2°

Differential phase:

Moire:

0

Y/C delay:

Under 15 ns

Tilt:

Less than 2% (V, H)

LF linearity:

Less than 2%

K factor:

Less than 2% (2T pulse)

Standard Accessories

- Shoulder belt×1
- Extension board for recording circuit×1
- Extension board for playback circuit×1
- Extension board for power supply circuit×1

Digital Audio System (based on standard playback machine) Sampling frequency: Quantizing: Frequency response: Dynamic range: Distortion: Crosstalk: Wow/flutter: Headroom: Emphasis Input level adjustment:	48 kHz (synchronized with video) 16 bits 20 Hz to 20 kHz (+0.5 dB/−1 dB) 85 dB (1 kHz emphasis OFF, "A" weighted) Less than 0.08% (1 kHz emphasis OFF, reference level) Less than −70 dB (1 kHz, between 2 channels) Below measurable level 20 dB T1=50μs/T2=15μs (ON/OFF selectable) −∞ to +15 dB
Video Input/Output Signals Video input: Composite digital serial input: Video output: Subcarrier signal output:	Camera input: 1.0 Vp-p, 75Ω (26-pin connector, SMPTE standard) LINE input: 1.0 Vp-p, 75Ω (BNC connector) Digital input: 0.8 Vp-p, 75Ω (BNC connector) VIDEO OUT1: 1.0 Vp-p, 75Ω (BNC connector) VIDEO OUT2: 1.0 Vp-p, 75Ω, accommodates superimposing (BNC connector) SC OUT: 2.0 Vp-p, 75Ω (BNC connector)
Audio Input/Output Signals AUDIO IN: AUDIO OUT:	Camera mic input: −60 dBu, 3 kΩ, balanced (26-pin connector, SMPTE standard) Line input: +4/−20/−60 dBu (NTSC) 0/−20/−60 dBu (PAL) High impedance, balanced type (XLR 3-pin connectors×2) Phantom power supply (+48 V or +12 V) Line output: +4 dBu (NTSC) 0 dBu (PAL) Low impedance, balanced output (XLR 3-pin connectors×2) Headphones: −∞ to −20 dB variable level, 8Ω (M6 jack)
Time Code Input/Output Signals TIME CODE IN: TIME CODE OUT:	2.4 V±1.4 Vp-p, 10 kΩ, balanced type (XLR 3-pin connector) 2.4 Vp-p, low-impedance, balanced type (XLR 3-pin connector)
Other Input/Output Signals EXT DC IN: REMOTE:	For optional AU-B110 AC adaptor (XLR4P connector) For optional AG-A67 remote controller (M3 jack)

*Specifications are subject to change without notice.

Controls and Their Functions (Operation Section)

1

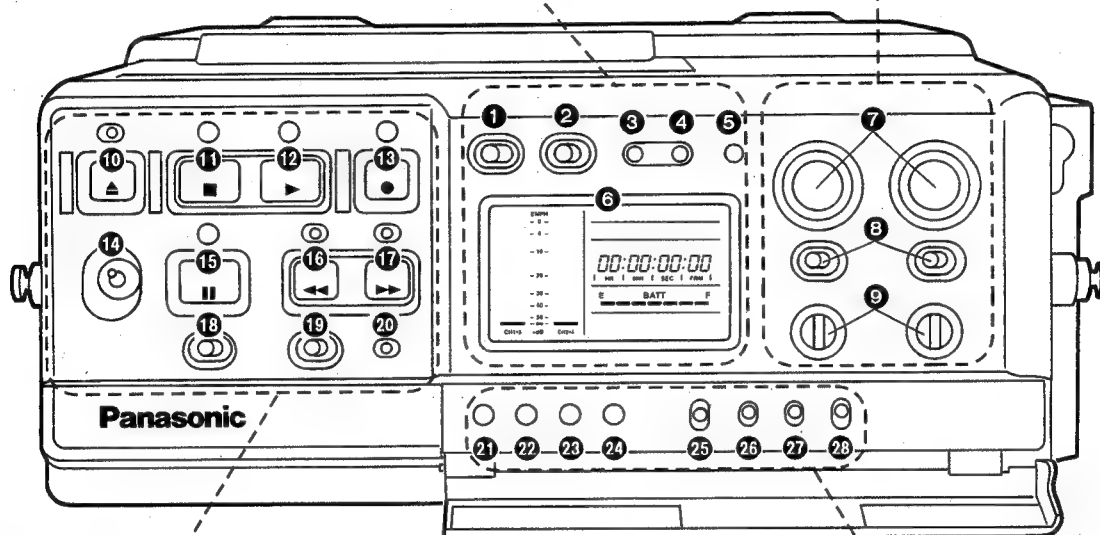
Outline

Display controls

- ① DISPLAY switch (➡ P. 25)
- ② LIGHT switch (➡ P. 32)
- ③ RESET button (➡ P. 32)
- ④ HOLD button (➡ P. 32)
- ⑤ WARNING lamp (➡ P. 54)
- ⑥ Display (➡ P. 10)

Audio controls

- ⑦ REC LEVEL controls (➡ P. 27)
- ⑧ UNITY/VAR switches (➡ P. 27)
- ⑨ PB LEVEL controls (➡ P. 31)



Basic controls

- ⑩ EJECT button (➡ P. 22)
- ⑪ STOP button (➡ P. 31)
- ⑫ PLAY button (➡ P. 31)
- ⑬ REC button (➡ P. 28)
- ⑭ POWER switch (➡ P. 22)
- ⑮ PAUSE/STILL button (➡ P. 29)
- ⑯ REW button (➡ P. 31)
- ⑰ FF button (➡ P. 31)
- ⑱ KEY INHIBIT switch (➡ below)
- ⑲ REC REVIEW switch (➡ P. 30)
- ⑳ DIGITAL lamp (➡ P. 32)

Sub panel controls

- ㉑ MENU button (➡ P. 33, 42)
- ㉒ SHIFT button (➡ P. 26, 33, 42)
- ㉓ ADV button (➡ P. 26, 33, 42)
- ㉔ START button (➡ P. 26, 33, 42)
- ㉕ SET/DIAG switch (➡ P. 33, 42)
- ㉖ VITC REC switch (➡ P. 25)
- ㉗ FREE/REC switch (➡ P. 25)
- ㉘ TC-SUPER switch (➡ P. 25)

- The WARNING lamp ⑤ lights when trouble has occurred in the unit. (➡ P. 54)
- When the KEY INHIBIT switch ⑱ is set to "ON", the operation of all the basic controls except for the EJECT button is prohibited and "INHIBIT" appears on the display.

Controls and Their Functions (Connector Panel)

Sound monitoring section

(→ P. 18)

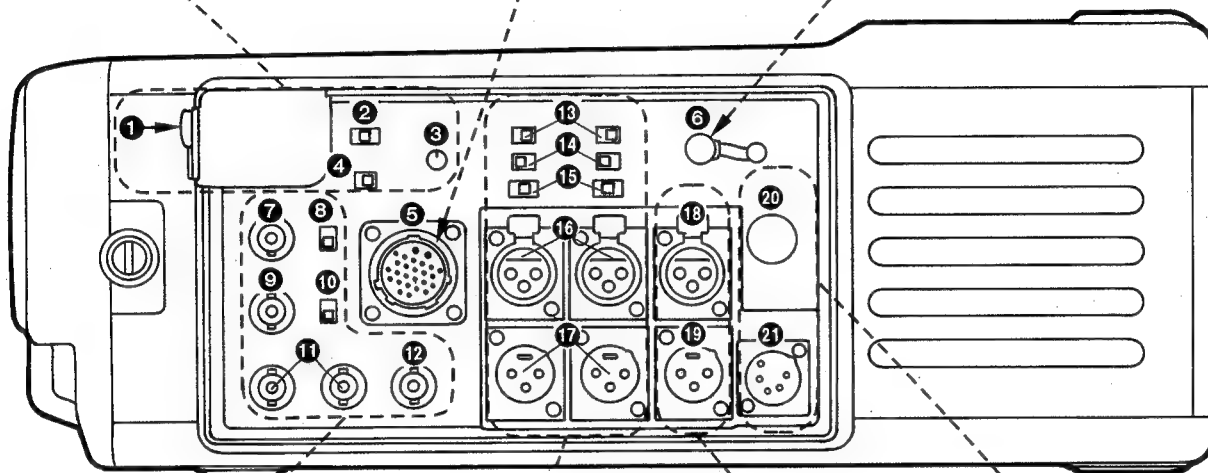
- ① HEADPHONES jack
- ② AUDIO MONITOR switch
- ③ AUDIO MONITOR LEVEL control
- ④ ALARM switch (→ P. 32)

Camera connector

- ⑤ CAMERA IN connector (→ P. 15)

Remote connector

- ⑥ REMOTE connector (→ P. 20)



Video input/output section

(→ P. 16)

- ⑦ COMPOSITE DIGITAL connector
- ⑧ DIGITAL/ANALOG switch
- ⑨ VIDEO IN connector
- ⑩ CAMERA/LINE switch
- ⑪ VIDEO OUT connectors 1/2
- ⑫ SC OUT connector

Time code section

(→ P. 19)

- ⑬ TC IN connector
- ⑭ TC OUT connector

Audio input/output section

(→ P. 17)

- ⑬ MIC power switches
- ⑭ CAM/LINE switches
- ⑮ Input level switches
- ⑯ AUDIO IN connectors
- ⑰ AUDIO OUT connectors (→ P. 18)

Power supply section

- ⑱ BREAKER button (→ below)
- ⑲ EXT DC IN socket (→ P. 14)

■ When an excessively high current flows to the inside of this unit, its circuit breaker is activated so that the power is automatically shut off to protect the unit.

Proceed with the steps below to restore the power.

- 1) Turn off the power.
- 2) Press in the ⑱ BREAKER button.
- 3) Turn on the power.

Display

1

Outline

Time code mode display

DF: Lights in drop frame mode (NTSC only).
VITC: Lights when LTC/VITC setting is at VITC.
 (SET menu ➡ P. 39).
SLAVE: Lights when external time code generator is connected.
2FLD: Lights when CF mode has been set to 2 fields.
 (SET menu ➡ P. 37)
HOLD: Lights when TC value is held.

VIDEO INPUT display

This flashes when there is no video input.

Counter display

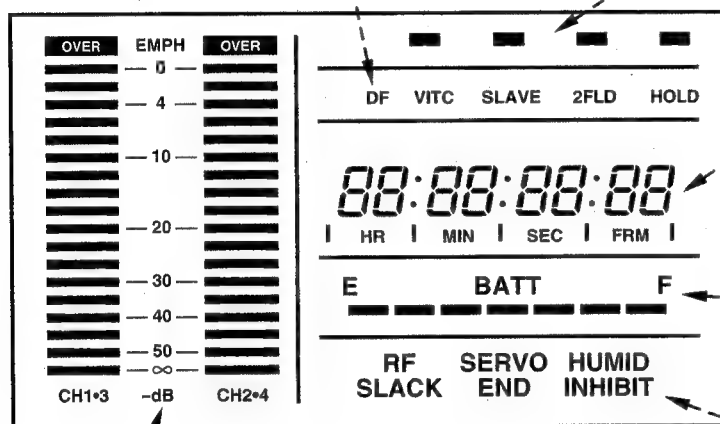
■ TC, UB, CTL display
 ■ Menu number display
 ■ Error code display
 (➡ P. 56)

Remaining battery charge display

E: Empty
F: Fully charged
 (➡ P. 13)

Warning display

This warns the operator of trouble in the unit.
 (➡ P. 54)



Audio level meter

This indicates the audio level.

OVER: Lights when level exceeds 0 dB.
EMPH: Lights when emphasis circuit is ON.

The scale units on the meter can be set up for fine adjustment.
 (SET menu ➡ P. 40)

■ Emphasis circuit

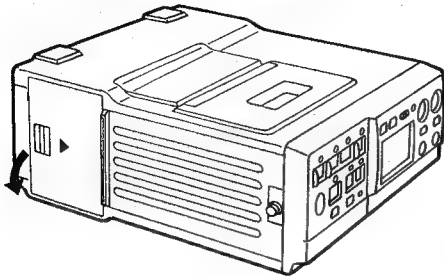
This boosts the high-frequency components of the audio input signals and records them. During playback, the signals are played back with only the previously boosted components attenuated, with the result that high-range noise is suppressed.
 (SET menu ➡ P. 40)

■ Counter display

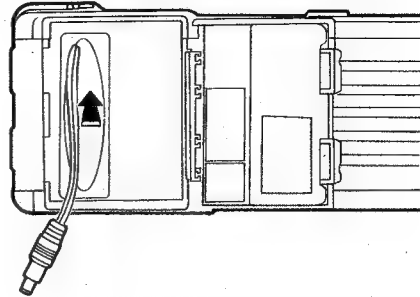
• Time code: 00:00:00:00 (hr:min:sec:frame)
 • User's bit: FF FF FF FF (hexadecimal notation)
 • CTL: 00:00:00:00 (hr:min:sec:frame)
 • Real time: 00:00:00:00 (hr:min:sec:frame)
 • Tape slack: 01
 • Menu: oP 1

When Using AU-BP402 Battery Pack (Option)

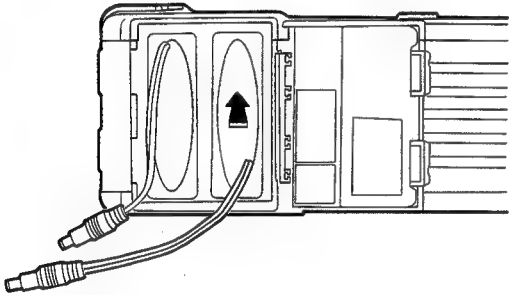
- 1** Open the battery compartment lid.



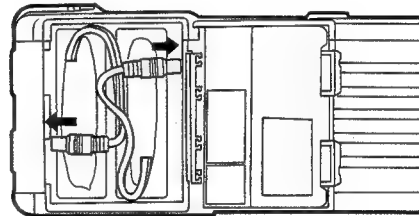
- 2** Insert the first battery pack.



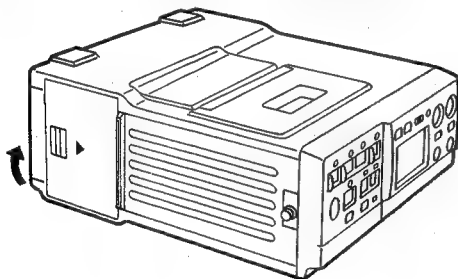
- 3** Insert the second battery pack.



- 4** Connect the plugs.



- 5** Close the battery compartment lid.



Taking out the battery

- 1) Open the battery compartment lid.
- 2) Disconnect the plugs.
- 3) Take out the battery.
- 4) Close the battery compartment lid.

■ Before using the AU-BP402 (option), recharge it using the AU-B420 battery charger (option). It takes about two hours to charge the battery pack.

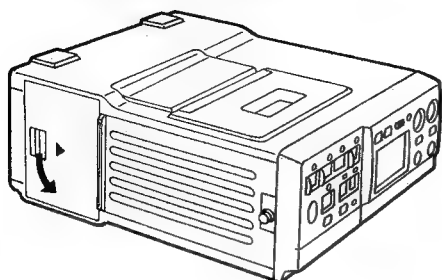
For further details on the AU-B420, refer to the Operating Instructions accompanying the battery charger.

■ It is recommended that the unit be powered by two battery packs even though it can still be operated using only one pack.

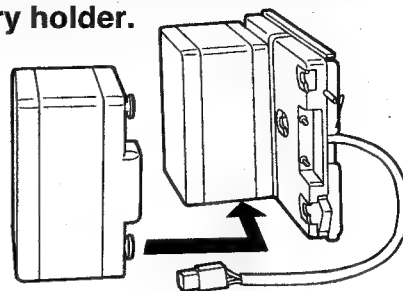
■ Do not pull the plug cable when taking out the battery packs.

When Using Battery Pack Made By Anton Bauer

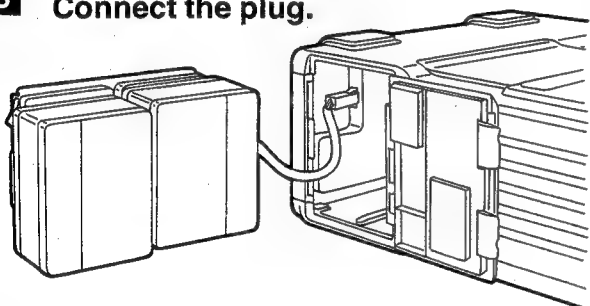
1 Open the battery compartment lid.



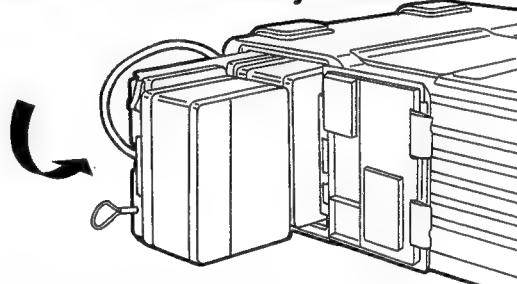
2 Attach the battery packs to the battery holder.



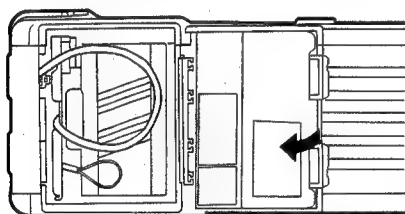
3 Connect the plug.



4 Store the battery inside.



5 Close the battery compartment lid.



Taking out the battery

- 1) Open the battery compartment lid.
- 2) Disconnect the plug.
- 3) Take out the battery.
- 4) Close the battery compartment lid.

■ The battery pack made by Anton Bauer which can be used with this unit is the COMPAC MAGNUM 13/14. (Always ensure that battery packs with the same voltage are used.)

■ Let two battery packs be used.

■ The battery holder (made by Anton Bauer) is required to use the company's battery packs.










■ Before using the battery pack, use the battery charger made by Anton Bauer to recharge it.

For information on the charging time and other details, refer to the Operating Instructions accompanying the battery charger used.

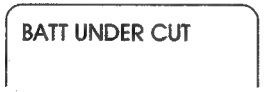
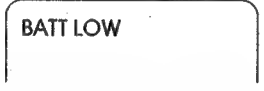
■ Do not pull the plug cable when taking out the battery.

Remaining Battery Charge Display

The remaining battery charge display differs according to the battery setting on the SET menu. (SET menu ➔ P. 41)

Remaining battery charge display	WARNING lamp	With 12 V setting	With 13.2 V setting	With 14.4 V setting	With silver-zinc setting	When Anton Bauer intelligent battery is used
	Flashes (battery undercut)	10.2 V or below	11.0 V or below	11.0 V or below	12.0 V or below	Battery undercut
	Flashes (low battery)	Less than 10.8 V	Less than 11.9 V	Less than 13.0 V	Less than 12.5 V	Low battery
	Off	10.8 V or above	11.9 V or above	13.0 V or above	12.5 V or above	—
	Off	11.3 V or above	12.4 V or above	13.5 V or above	—	10%
	Off	11.5 V or above	12.7 V or above	13.8 V or above	—	30%
	Off	11.8 V or above	12.9 V or above	14.1 V or above	—	50%
	Off	12.0 V or above	13.2 V or above	14.4 V or above	13.5 V or above	70%
	Off	12.5 V or above	13.8 V or above	15.0 V or above	—	90%
	Off	13.0 V or above	14.3 V or above	15.6 V or above	—	Max.

• When the WARNING lamp flashes, the displays shown below appear on the monitor/viewfinder.

Battery undercut	
Low battery (only when Anton Bauer intelligent battery is used)	

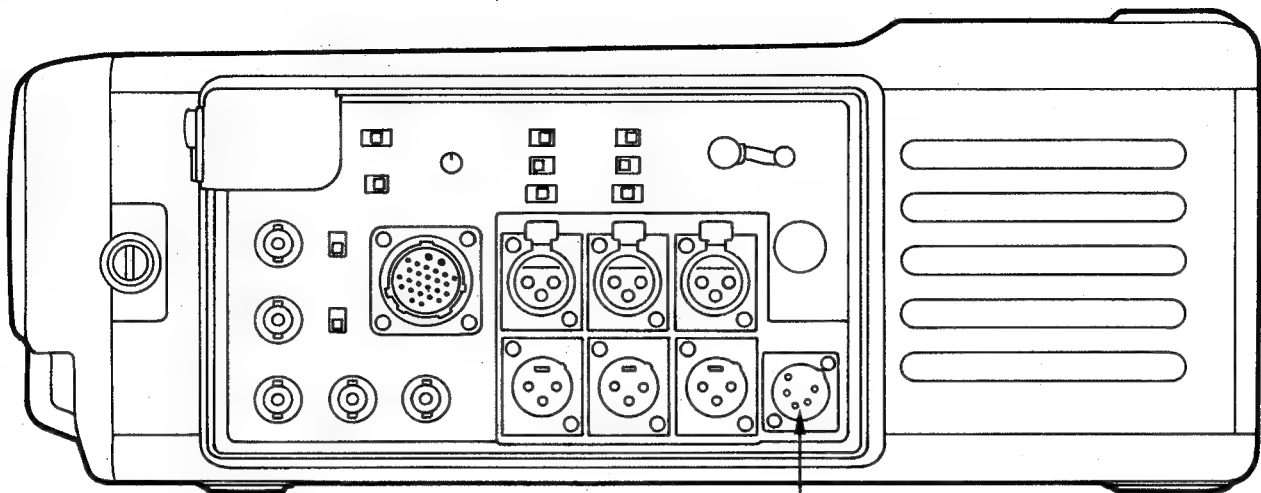
■ When the WARNING lamp flashes, regular operations can no longer be performed. Replace the battery packs with fully charged ones. (When replacing the battery packs, replace both packs at the same time.)

■ A cassette tape can be ejected even when the WARNING lamp flashes. (It cannot be ejected, however, when the voltage is 9.5 V or below so do not repeatedly attempt to eject the cassette.)

■ When the Anton Bauer intelligent battery is used, the remaining charge in the battery is indicated for several seconds on the viewfinder as a percentage. Normal voltage detection is performed if there is no charge remaining in the battery when the power is turned on.

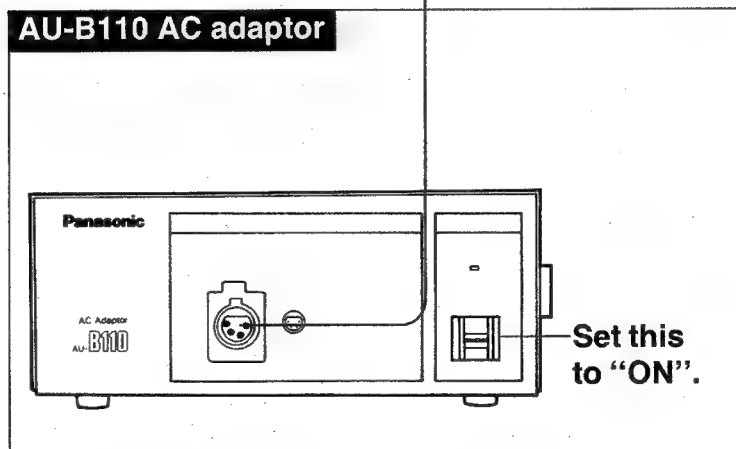
■ When the unit is not going to be used for a prolonged period of time, remove the battery packs from the unit.

When Using AU-B110 AC Adaptor (Option)



Use the DC cable to connect these connectors.

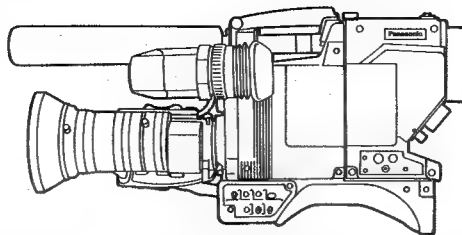
AU-B110 AC adaptor



- When both the battery packs and AC power have been connected at the same time, supply of the AC power takes precedence.
- Improper connection of the DC cable may lead to defective contact, causing the power supply to fail. Be sure to connect this cable properly.

Camera (26P Connector) Connections

CAMERA IN connector (26P)

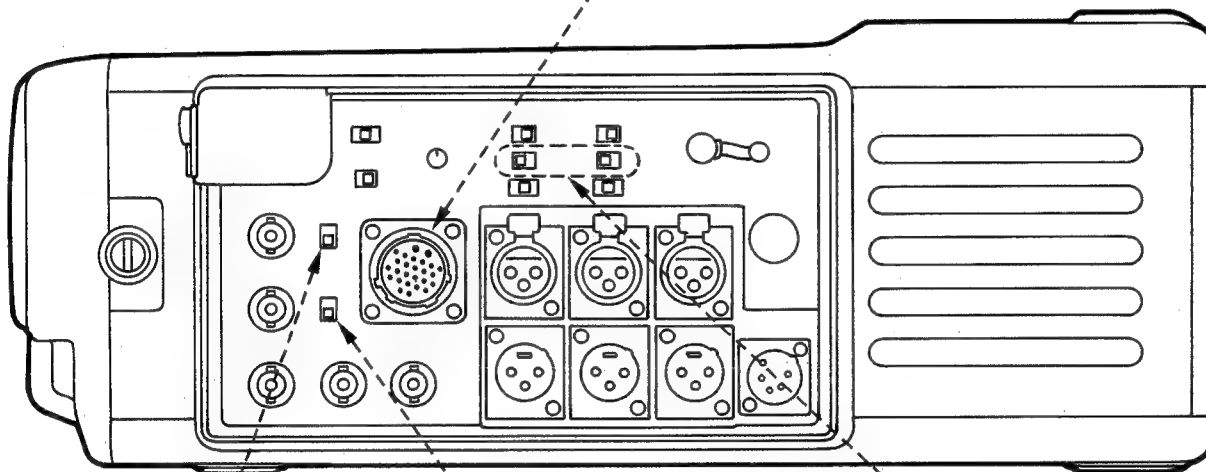


Use this to connect a camera (composite output) with a 26-pin connector.

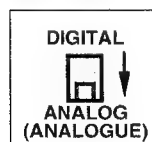
Notes

This unit cannot be connected to a camera which supplies only component video output signal.

If the camera has a composite/component output selector switch, make sure that the switch is set to the composite position.



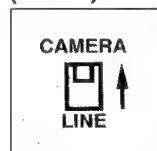
DIGITAL/ANALOG switch



Set this to "ANALOG".

CAMERA/LINE switch

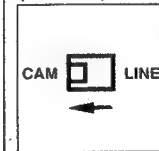
(VIDEO)



Set this to "CAMERA".

CAM/LINE switches

(AUDIO)



Set these to "CAM".

■ The following operations can be performed using the CAMERA IN connector (26-pin multi-connector).

- Recording of video and audio signals from the camera
- Supply of power from this unit to camera
- Control of this unit's operations using VTR start/stop button on camera
- Superimposing onto viewfinder
- Sending of WARNING signal/TAPE REMAIN signal which also serve as REC/TALLY

■ When the 26-pin multi-connector is used to connect a camera which can output digital video signals, set the DIGITAL/ANALOG switch to "DIGITAL".

■ When recording audio signals from the AUDIO IN connectors, set the CAM/LINE (AUDIO IN) switch to "LINE".

Video Signal-Related Connections

VIDEO IN connector

Supply the analog video signals to this connector.
Use it to connect a video unit or a camera which does not have a 26-pin connector.

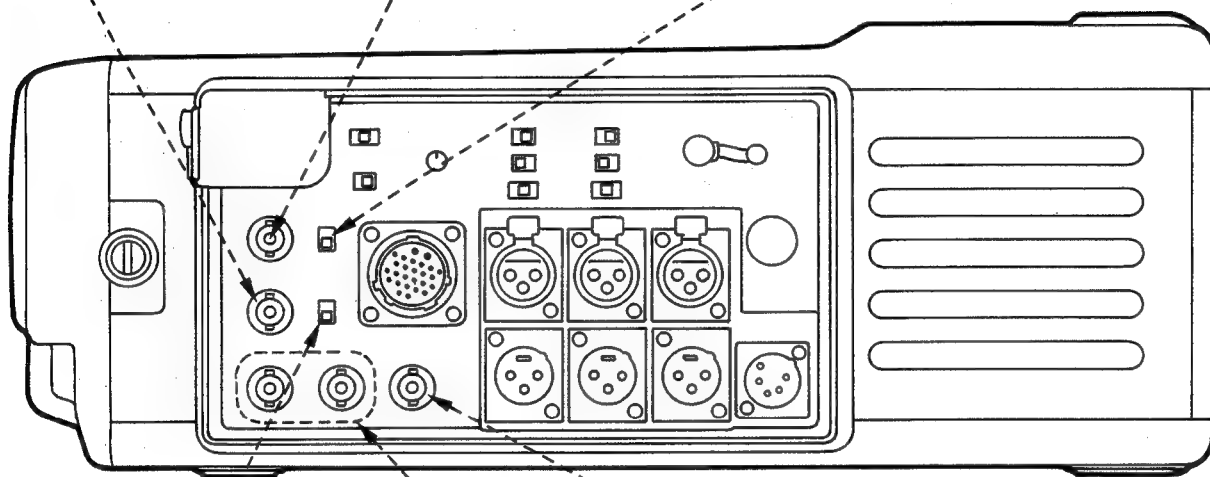
COMPOSITE DIGITAL VIDEO IN connector

Supply the serial digital video signals to this connector.

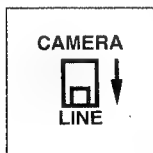
DIGITAL/ANALOG switch

Use this to select the type of input video signals.

DIGITAL: For digital signals
ANALOG: For analog signals



CAMERA/LINE switch



Set this to "LINE".

VIDEO OUT connectors

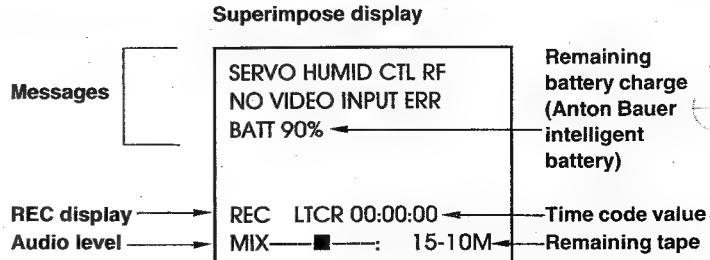
These are the video output connectors: connect them to the TV monitor, etc.

The VIDEO OUT2 connector can accommodate superimposing.

SC OUT connector

When recording video signals from a VTR which is not equipped with its own time base corrector (TBC), supply the SC signals from this connector to the VTR.

- When adding superimpose signals to the video signals from the VIDEO OUT2 connector, set the TC-SUPER switch on the sub panel to "ON". (Refer to page 61 for a detailed description of the superimpose displays.)



Audio Input-Related Connections

MIC POWER switches

These are used to supply power to the phantom microphone.

ON: Microphone powered by external power supply

OFF: Microphone requiring no external power supply

CAM/LINE (AUDIO IN) switches

CAM: The audio signals from the CAMERA IN connector are recorded.

LINE: The audio signals from the AUDIO IN connectors are recorded.

Input level switches

These are used to select the audio input level. (➡ P. 27)

—60/—20/+4 (NTSC)

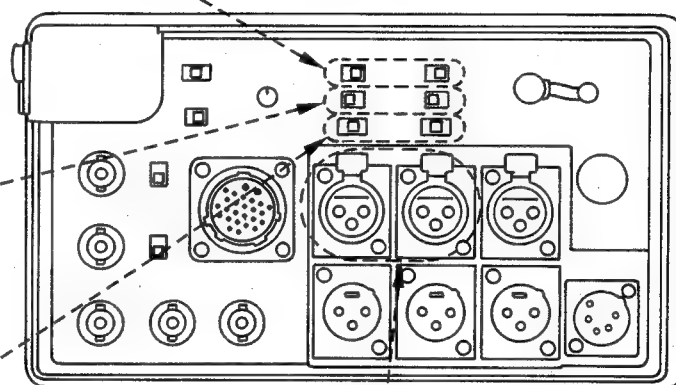
—60/—20/+0 (PAL)

Audio input connectors

The audio signals are supplied to these connectors.

CH1•3: Audio input connector for odd-numbered tracks.

CH2•4: Audio input connector for even-numbered tracks.



■ Four audio tracks are available with this unit although there are only two input systems. The same signals are recorded for CH1 and CH3 (odd-numbered tracks) and for CH2 and CH4 (even-numbered) tracks.

■ The voltage and sensitivity of the phantom microphone can be selected using the switches on the circuit board inside. (➡ P. 60)

Audio Output (Monitor) Related Connections

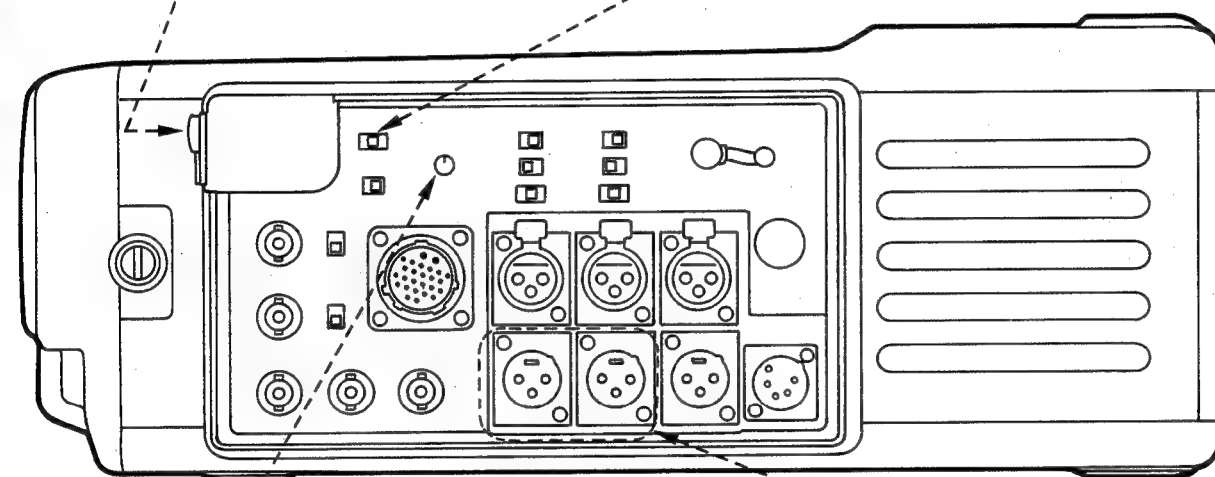
HEADPHONES jack

Use this to connect the headphones (M6).

AUDIO MONITOR switch

Use this to select the audio signals which are output from the HEADPHONES jack.

CH1: Odd-numbered track sound
MIX: Mixed sound
CH2: Even-numbered track sound



AUDIO MONITOR LEVEL control

Use this to adjust the level of the sound which is output from the HEADPHONES jack.

AUDIO OUT connectors

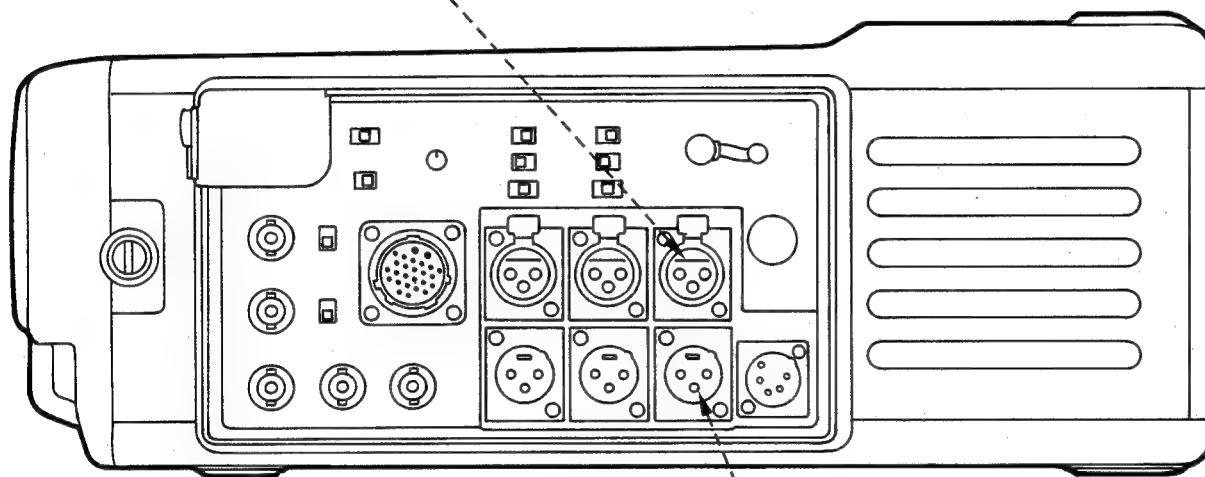
The audio signals are output from these connectors.

CH1: Odd-numbered track sound is output.
CH2: Even-numbered track sound is output.

Time Code Signal-Related Connections

TC IN connector

External time code signals are supplied to this connector to lock the time code value of this unit (slave).



TC OUT connector

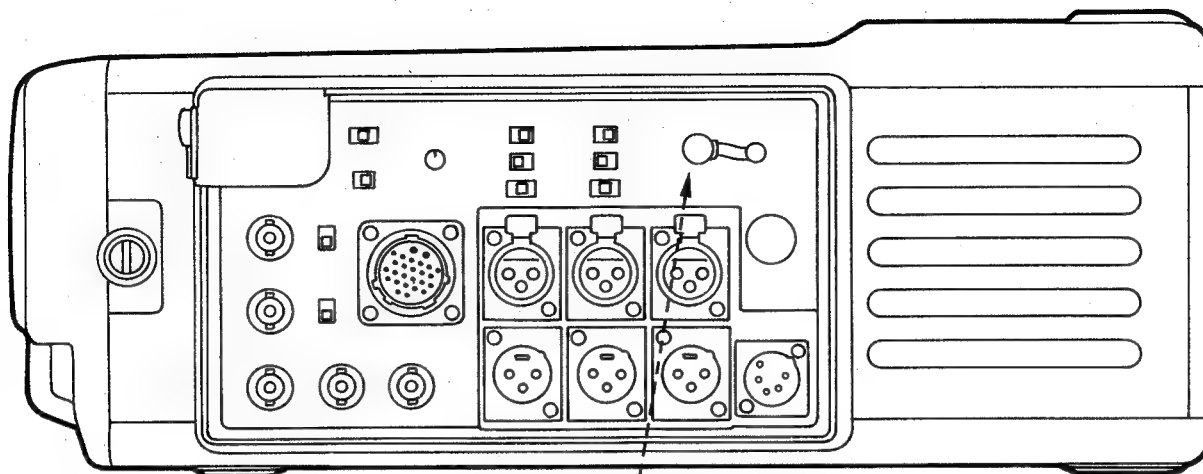
The time code signals are output from this connector.

It is used to lock the time code of another VTR (slave) with the time code value of this unit.

- Set the FREE/REC switch on the sub panel to "FREE" when locking the TCG value of this unit (slave) to an external time code.

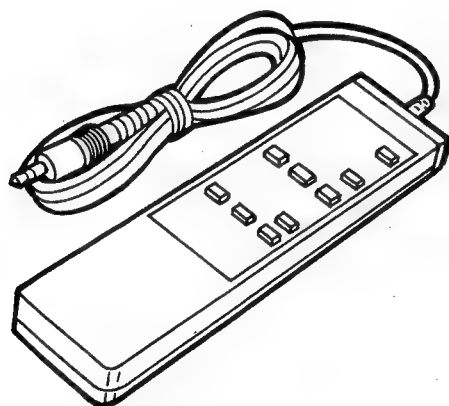
- The following signals are output from the TC OUT connector.
 - The internal TCG value which has been synchronized with the external TCG is output when an external TCG has been connected.
 - In all other cases, the internal TCG value is output. (The TCG value is output even during playback.)

Remote Controller Connections



REMOTE connector

This unit can be controlled using the optional AG-A67 remote controller.



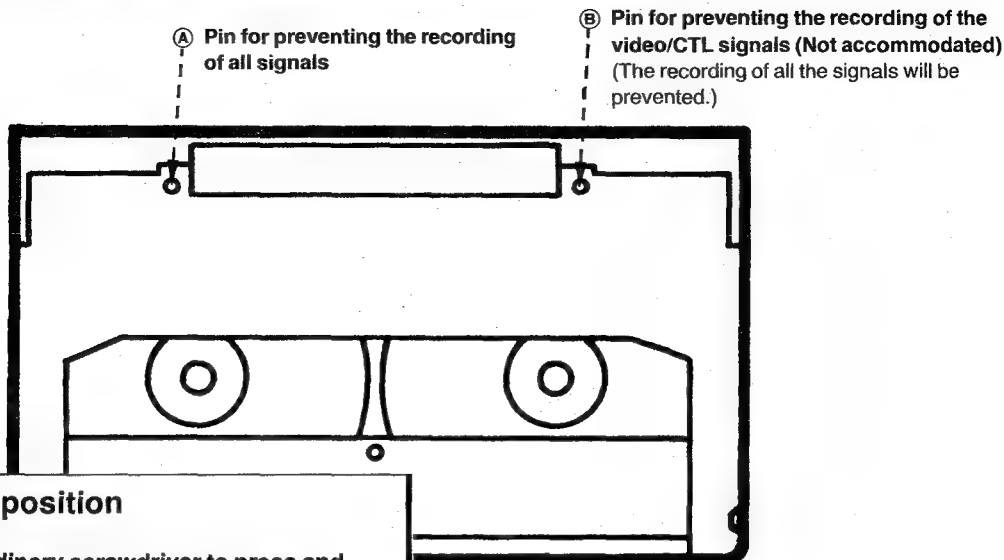
Function of the AG-A67 when it is connected to AJ-D320

- REC button:** Recording starts when this is pressed.
- REC REVIEW:** This does not function.
- REW button:** The tape is rewound when this is pressed.
- STOP button:** The tape is stopped when this is pressed.
- FF button:** The tape is fast forwarded when this is pressed.
- PLAY button:** Playback starts when this is pressed.
- PAUSE/STILL button:** During recording, the recording pause mode is established/released; during playback, still picture playback is established/released.
- REV ADV button:** This does not function.
- FWD ADV button:** This does not function.

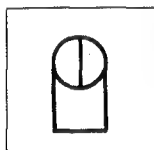
- Switch off the VTR's power before connecting or disconnecting the AG-A67 remote controller.
- The power for the AG-A67 remote controller is supplied from the VTR.

- When the AG-A67 remote controller is used to control this unit, set the KEY INHIBIT switch on the front panel to the "ON" position.

Cassettes

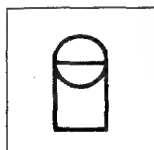


Recording enable position



Use an ordinary screwdriver to press and turn this 90° clockwise so that the pin is set to its "down" position.

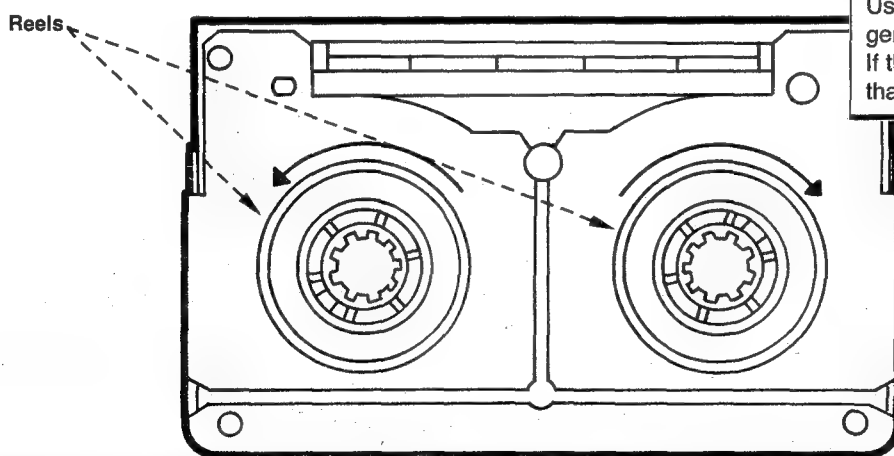
Recording prevention position



Use an ordinary screwdriver to press and turn this 90° counterclockwise so that the pin is set to its "up" position.

Taking up tape slack

Use your finger to turn the reel gently in the direction of the arrow. If the reel does not turn, it means that the tape is not slack.



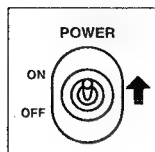
■ This unit uses S cassettes only.

■ Recording can be prohibited by setting the recording prevention pin provided on the cassette. Use this pin to prevent accidental erasure.

■ The pin (A) setting takes precedence over pin (B) setting. To prevent all the signals from being recorded, set only pin (A) to the recording prevention position. (Since this unit does not come with an audio or time code editing function, it cannot accommodate pin (B). Even when only pin (B) has been set to the recording prevention position, the recording of all the signals will be prevented.)

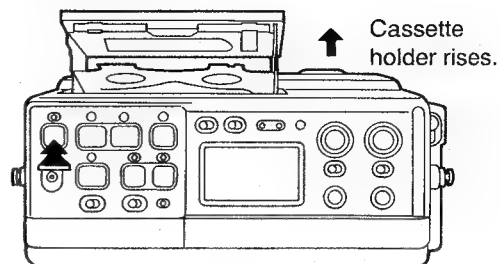
Cassette Loading and Unloading

1 Turn on the power.

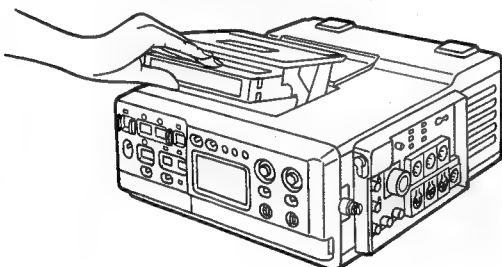


Set this switch to "ON".

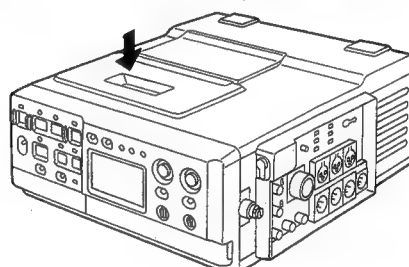
2 Press the EJECT button.



3 Load the cassette.



4 Press down on the cassette holder.



How to remove the cassette

- 1) Press the EJECT button.
- 2) The cassette holder rises.
- 3) Take out the cassette.
- 4) Press down on the cassette holder.

■ If the HUMID display lights when the power is turned on, it means that condensation has formed inside the unit. In a case like this, do not load the cassette but keep the power on and wait for a short period of time. When the HUMID display disappears, the unit can be operated normally.
(➔ P. 54)

■ Insert the cassette into the cassette holder properly without forcing it in any way.

■ It cannot be ejected when the battery voltage is less than about 9.5 V.
(➔ P. 13)

Recording Operation Flow Chart

Input signal selection (➡ P. 24)



SET menu setting (➡ P. 33)



Time code setting (➡ P. 25)
TC/UB presetting (➡ P. 26)



Audio recording level
adjustment (➡ P. 27)



Recording start (➡ P. 28)



For details on REC PAUSE
mode (➡ P. 29)



Recording review (➡ P. 30)

■ For the sake of convenience, the above flow chart has been provided to show the operations that must be performed for recording.

■ Since a description of the SET menu operation is given in the SET menu section, it is omitted here.

■ Have the equipment connected, the power supply readied and the cassette already loaded.

Input Signal Selection

Setting the audio input signals

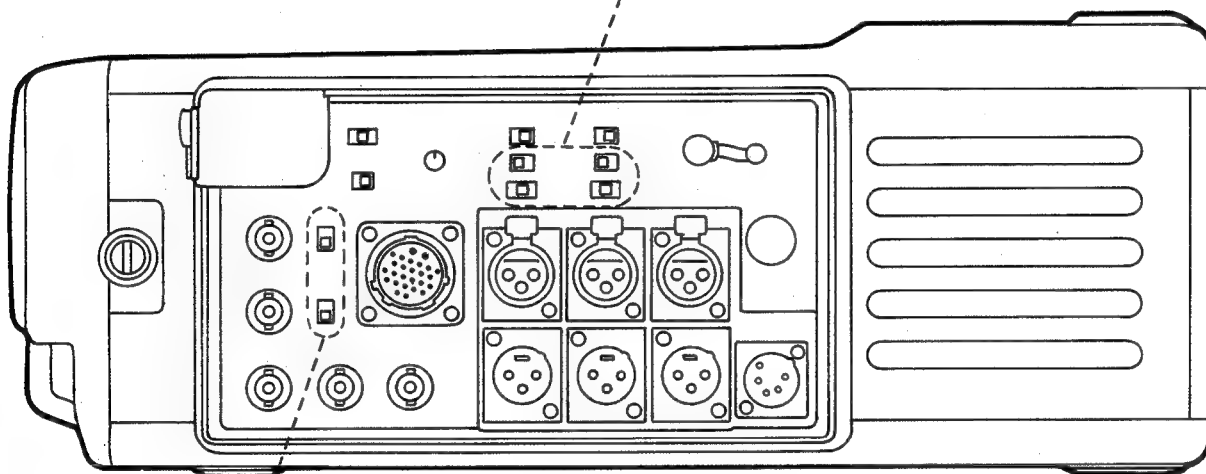
CAM/LINE switches

CAM: For recording sound from the camera (26-pin connector)

LINE: For recording sound from the AUDIO IN connectors

Input level switches

Use this to select the input signal level. (➔ P. 27)



Setting the video input signals

DIGITAL/ANALOG switch

DIGITAL: For recording composite digital video signals

ANALOG: For recording analog video signals

CAMERA/LINE switch

CAMERA: For recording video signals from the CAMERA IN connector

LINE: For recording video signals from the VIDEO IN connector

- See pages 16 and 17 for details on the connections of the connectors.

Time Code Setting

DISPLAY switch setting

Use this to select the data indicated on the counter part of the display.

TC: This indicates the time code value.
UB: This indicates the user's bit value.
CTL: This indicates the CTL value.

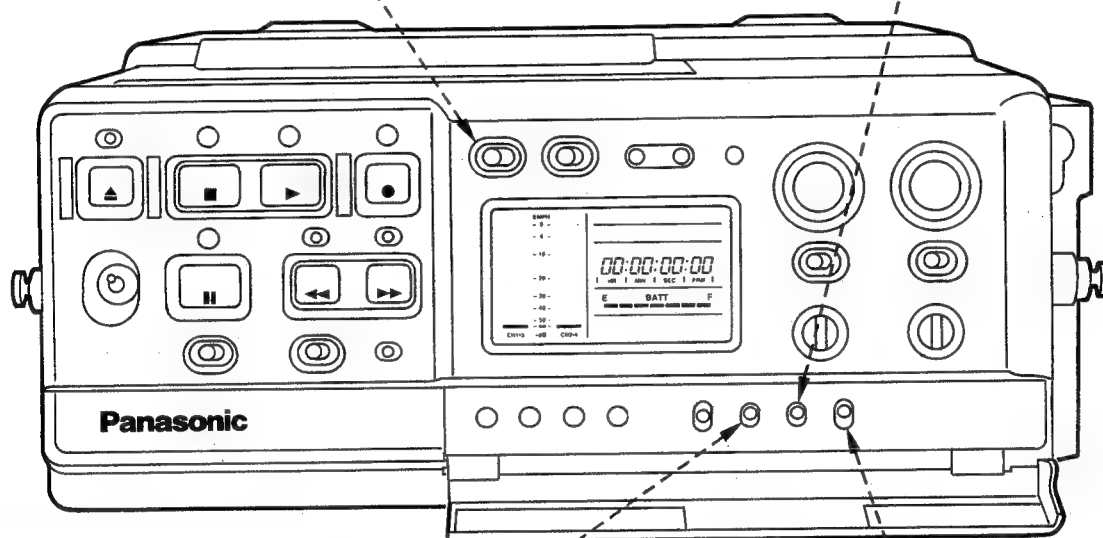
FREE/REC switch setting

FREE (FREE RUN):

The time code advances at all times.
 When an external TCG is connected, the unit's internal TCG is synchronized with its time code.

REC (REC RUN):

The time code advances only during recording.
 In the case of frame-to-frame continuity, it is locked to the LTC value on the tape.



VITC REC switch setting

ON: VITC is recorded.
OFF: VITC is not recorded.

- VITC recording is possible with this unit but not playback.

TC-SUPER switch setting

ON: The time code data is superimposed onto the camera viewfinder and the monitor connected to the VIDEO OUT 2 connector.

CAM: The time code data is superimposed onto the camera viewfinder.

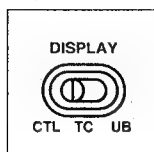
OFF: The time code data is not superimposed.

- Set the time code in the EJECT or REC PAUSE mode.
- Besides time code data, error messages can also be superimposed onto the display. (➔ P. 55)
- What is superimposed onto the viewfinder is displayed when the return video switch on the camera is pressed.

- In addition to the above, the following can also be set in the SET menu mode. (SET menu ➔ P. 39)
 - VITC/LTC selection
 - DF/NDF selection (NTSC model only)
 - REAL TIME setting
 - REGEN mode setting
 - TCG CF FLAG ON/OFF
 - VITC insertion line setting

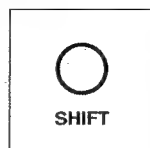
TC/UB Preset Settings

1 Selecting the data to be set



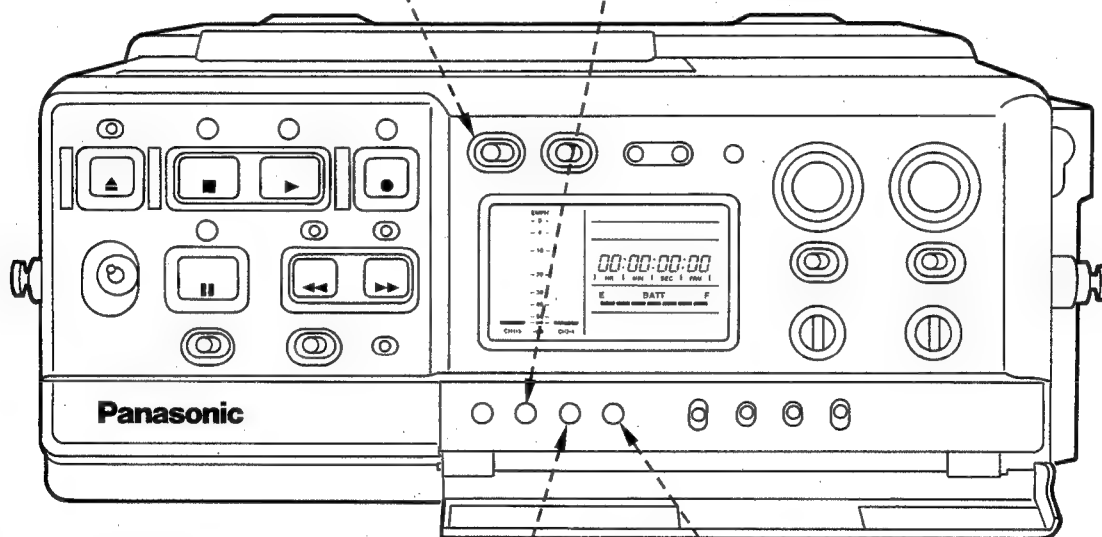
TC: For presetting the time code
UB: For presetting the user's bit

2 Selecting what is to be set

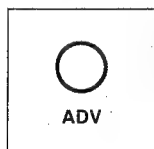


When this is pressed, the left end of the counter display flashes. Every time it is subsequently pressed, the flashing moves to the right.

This flashes. → 00:00:00:00



3 Setting numbers



Each time this is pressed, the number is incremented.

10:00:00:00

The number of flashing figures is incremented.

4 Entering the settings



When this is pressed, the setting is entered.

12:34:56:12

The flashing stops.

■ The setting range for the time code preset value is as shown below:

00:00:00:00 to 23:59:59:29 (NTSC)

00:00:00:00 to 23:59:59:24 (PAL)

■ The setting range for the user's bit preset value is as shown below (user's bit=hexadecimal format):

00 00 00 00 to FF FF FF FF

The following alphanumeric appear on the display:

0 to 9, A, b, c, d, E, F

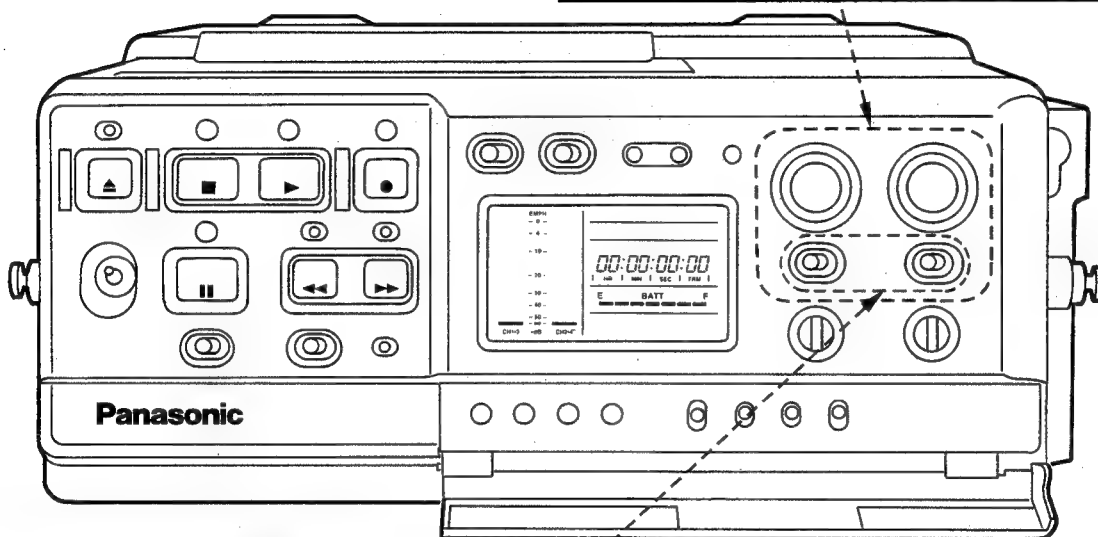
Audio Recording Level Adjustment

Manual adjustment

1) Set the UNITY/VAR switch to "VAR".

2) Turn the REC LEVEL control to adjust the level.

While monitoring the audio level meter on the display, make an adjustment using this control so that the maximum input level does not exceed 0 dBu.



UNITY/VAR switches

UNITY: Set to this position when recording sound at the unity gain (standard value). With this setting, the REC LEVEL control does not function even when it is operated.

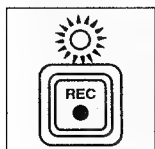
VAR: Set to this position when adjusting the audio recording level manually. Use the REC LEVEL control to adjust the recording level as desired.

- Adjust the audio recording level in the REC, EJECT or REC PAUSE mode.
- When adjusting the audio level more precisely, the scale units on the display's audio level meter can be changed to enable fine adjustment.
(SET menu ➡ P. 40)

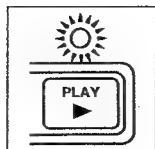
- Selecting the input signal level
Use the input level switch in the connector section to select a value which matches the input signal level while monitoring the audio level meter.
 - 60 dB: When the level is near –60 dB
 - 20 dB: When the level is near –20 dB
 - +4 (0) dB: When the level is near +4 (0) dB
(NTSC: +4 dB, PAL: 0 dB)

Recording Start

1 Start recording.

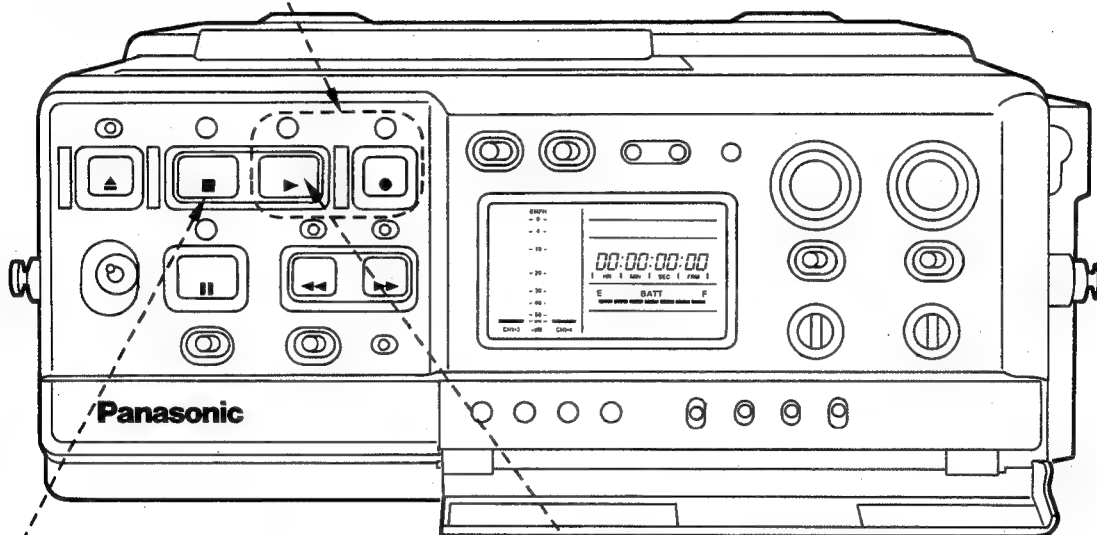


While pressing this,

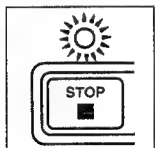


press this also.

The lamp on the REC button lights and recording starts.



2 Stop the recording.



Press this.

Recording now stops.

Simultaneous playback



Press this during recording.

The simultaneous playback picture can be monitored from the VIDEO OUT connector.

- Check the following points during recording.
 - Is the warning lamp lighted?
 - Is the remaining battery charge sufficient?
 - Has the cassette's recording prevention pin been released?
 - Is the tape in the cassette slack?

- The EJECT, REW, FF and PLAY buttons cannot be operated during recording.

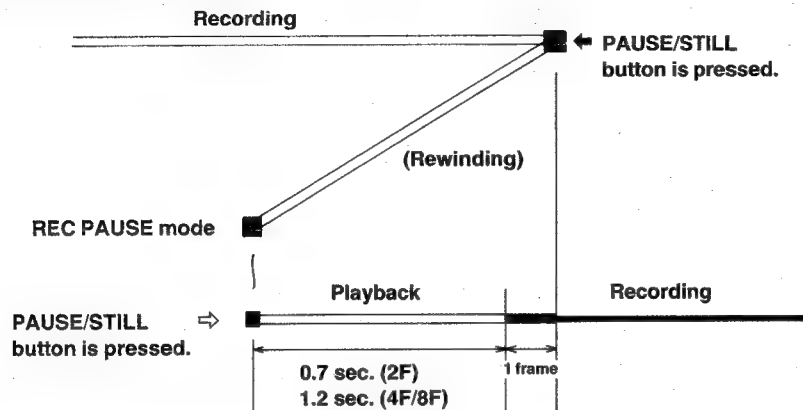
- When the camera has been connected using the 26-pin multi-connector, recording can be started and stopped using the VTR START/STOP button on the camera. In this case, set the unit to the recording enable mode beforehand (by pressing the REC+PLAY buttons).

(For details on the camera's operations, refer to the Operating Instructions accompanying the camera.)

REC PAUSE Mode

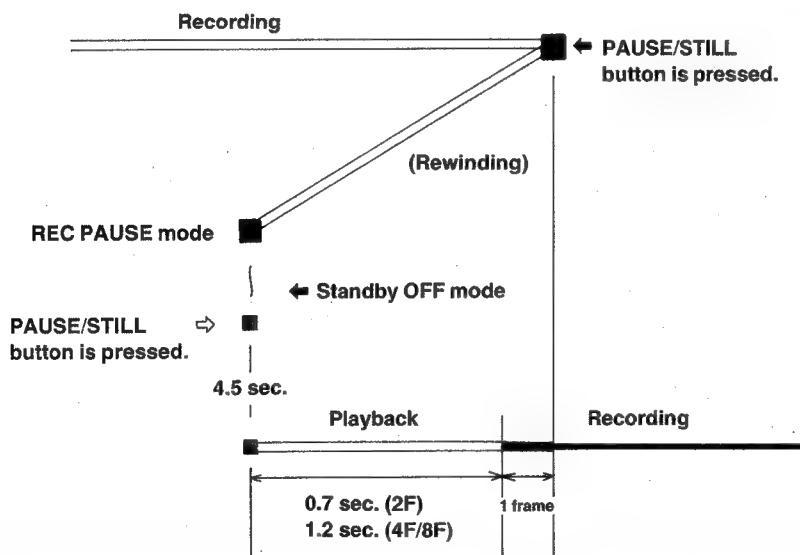
Resuming recording from the REC PAUSE mode

When the PAUSE/STILL button is pressed during recording, the unit is set to the REC PAUSE mode, and recording is stopped temporarily. When the same button is pressed again, recording is resumed.



Resuming recording from the standby OFF mode

When the unit is kept in the REC PAUSE mode for more than a specified period of time, it is set to the standby OFF mode in order to protect the tape. It takes a little time to resume recording from the standby OFF mode.



■ When recording is resumed, part of what has already been recorded is erased (back space editing function) to ensure smooth frame-to-frame continuity.

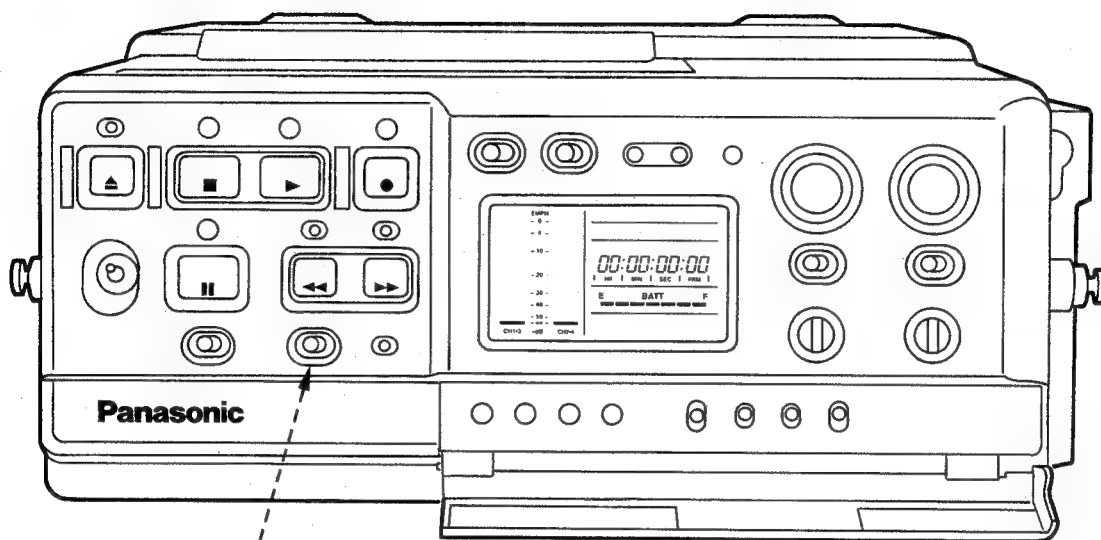
■ The duration of the playback differs according to the "COLOR FRAME" setting on the OPERATION SET menu. It is 0.7 sec. in the 2F mode and 1.2 sec. in the 4F (8F) mode (4F: NTSC; 8F: PAL).

■ The standby duration mode can be set on the SET menu. (➔ P. 37)

■ Proceed with the settings below to record the time code which is continuous even when the recording is suspended midway.

- Set the FREE/REC switch on the sub panel to "REC".
- Set "REGEN" on the TIME CODE SET menu to "ON".

Recording Review

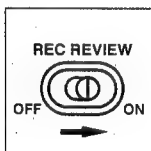


Panasonic

Operation

5

1 Review what has been recorded.



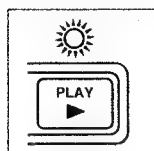
Set this to "ON".

When the recorded has been temporarily stopped (REC PAUSE), the last 2 seconds of what has been recorded is automatically played back once. After playback, the unit is returned to the REC PAUSE mode.

- Use the recording review function after having recorded for more than 2 seconds.

Playback-Related Operations

Playback

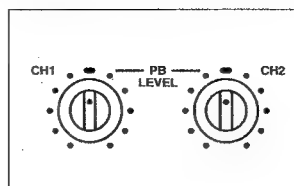


Press this.

Playback now starts.

Basic control section

Playback level adjustment

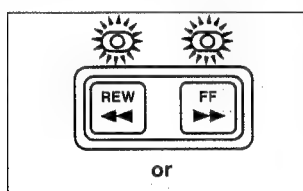


Audio adjustment section

The playback audio level is increased by turning these controls clockwise and reduced by turning them counterclockwise.

Fast forwarding/rewinding

(Search playback at 16 times normal tape speed)



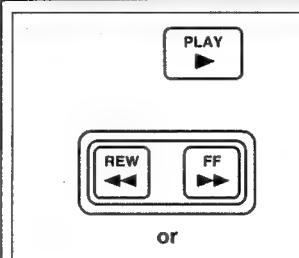
or

Basic control section

Press one of these while the unit is in the stop mode.

The tape is fast forwarded or rewound at 16 times the normal tape speed.

Search playback (×5)

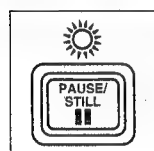


Basic control section

While pressing this
press this also.

The tape is searched and played back at 5 times the normal tape speed.

Still-picture playback

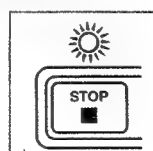


Press this during playback.

Still pictures are played back.

Basic control section

Stop



Press this.

All the tape transport functions are stopped.

Basic control section

■ When still-picture playback is maintained beyond the specified period of time, the unit is set to the standby OFF mode. (SET menu → P. 37)

■ To release search playback (×5), press the buttons below.

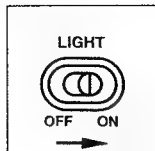
- PLAY button →The unit is set to the PLAY mode.
- STOP button →The unit is set to the STOP mode.
- FF button →The unit is set to the FF mode.
- REW button →The unit is set to the REW mode.

■ During playback, the time code is as follows:

- The TCG value is output from the TC OUT connector.
- The LTCR value is indicated on the display.
- The hours, minutes and seconds are indicated along with the CTL, TC and UB real-time on the superimpose display. However, the fixed user bit is indicated in 8 digits.
- The VITC signal cannot be read out with this unit.

Other Operations

Display lighting

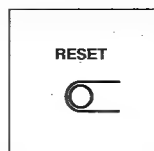


Top of display

Set this to "ON".

The display section lights up brightly.

CTL value resetting

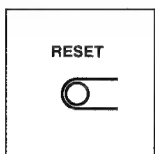


Top of display

Press this when CTL is displayed.

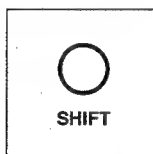
The CTL value is reset to "00:00:00:00".

TC/UB value resetting



Top of display

+

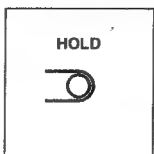


Sub panel section

Press these together when TC or UB is displayed.

The TC/UB value is reset.

Counter value holding

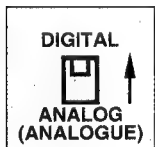


Top of display

Press this when counter value is displayed.

The counter value applying when the button was pressed is now held on the display. When the button is pressed again, the hold display function is released.

DIGITAL lamp



Connector section

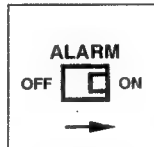
Set this to "DIGITAL".

The DIGITAL lamp lights when the composite digital video input signal is supplied.



Basic control section

Alarm function



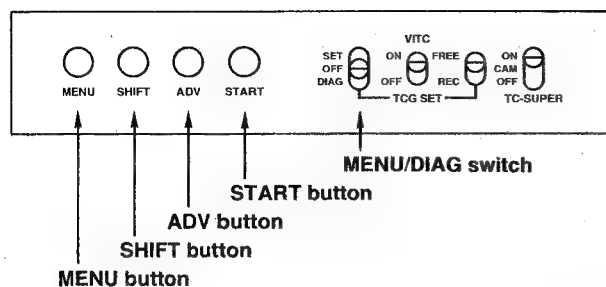
Connector section

Set this to "ON".

An alarm informs the operator when a warning appears on the display.

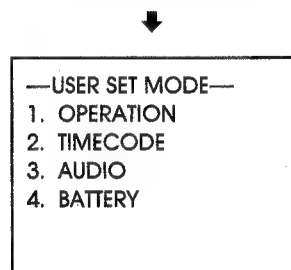
SET Menu Flow Chart

Sub panel section



How to display the SET menu

- 1) STOP/EJECT mode
- 2) TC SUPER switch→ON or CAMERA
- 3) SET/DIAG switch→SET
- 4) Press the MENU button.



(Monitor/viewfinder)

Use the SHIFT button to select.

Press the START button.

Press the START button.

Press the START button.

Press the START button.

- 1) Entering items using the SHIFT button
- 2) Selecting the mode using the ADV button
- 3) Selecting the mode using the START button

■ OPERATION SET menu

- OPERATION SET1—
1. NOT USED
 2. COLOR FRAME
 3. READY OFF TIME
 4. READY OFF MODE
 5. CHAR BATTERY

- OPERATION SET2—
6. CHAR REMAIN
 7. CHAR AUDIO LEVEL
 8. CHAR WARNING

■ TIMECODE SET menu

- TIME CODE SET1—
1. VITC/LTC
 2. DF/NDF (NTSC only)
 3. REAL TIME
 4. REGEN
 5. TCG CF FLAG

- TIME CODE SET2—
6. VITC POSITION1
 7. VITC POSITION2

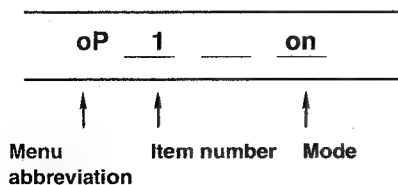
■ AUDIO SET menu

- AUDIO SET—
1. METER EXPAND
 2. PEAK HOLD
 3. OVER HOLD TIME
 4. EMPHASIS
 5. LIMITER

■ BATTERY SET menu

- BATTERY SET—
1. SELECT

■ The setting mode appears on the display.



■ Menu abbreviations

- oP: OPERATION SET menu
tc: TIMECODE SET menu
Au: AUDIO SET menu
bA: BATTERY SET menu

SET Menu Function Operation Method

1

Setting the unit to the STOP/EJECT mode

2

Selecting the SET menu function

SET
OFF
DIAG

Set this to "SET".

3

Transfer to the USER SET mode

MENU

Press this button.

The main menu appears.

Display

oP

Monitor/viewfinder

—USER SET MODE—

- 1. OPERATION
- 2. TIMECODE
- 3. AUDIO
- 4. BATTERY

4

Selecting the menu

SHIFT

Press this button.

A menu is selected each time this button is pressed.

Display

Au

Monitor/viewfinder

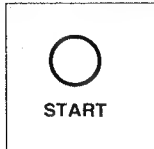
—USER SET MODE—

- 1. OPERATION
- 2. TIMECODE
- 3. AUDIO
- 4. BATTERY

6 Menus

34

5 Transfer to the selected menu

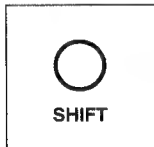


Press this button.

The sub menu appears.

Display	Monitor/viewfinder
Au 1 50	—AUDIO SET— ■ 1. METER EXPAND 2. PEAK HOLD 3. OVER HOLD TIME 4. EMPHASIS 5. LIMITER Mode setting → 50 dB

6 Selecting the setting item

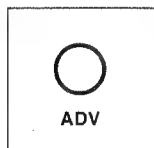


Press this button.

An item is selected each time this button is pressed.

Display	Monitor/viewfinder
Au 3 S	—AUDIO SET— 1. METER EXPAND 2. PEAK HOLD ■ 3. OVER HOLD TIME 4. EMPHASIS 5. LIMITER Mode setting → SHORT

7 Selecting the mode setting



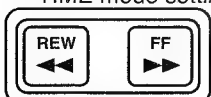
Press this button.

The mode setting is changed each time this button is pressed.

Display	Monitor/viewfinder
Au 3 F	—AUDIO SET— 1. METER EXPAND 2. PEAK HOLD ■ 3. OVER HOLD TIME 4. EMPHASIS 5. LIMITER Mode setting → FULL
Flashes	

Menus 6

- Use the FF/REW buttons to select the 3. READY OFF TIME mode setting in OPERATION SET1.



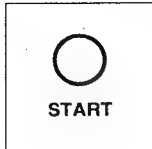
Basic control section

Press one of these buttons.

FF: For a higher number
REW: For a lower number

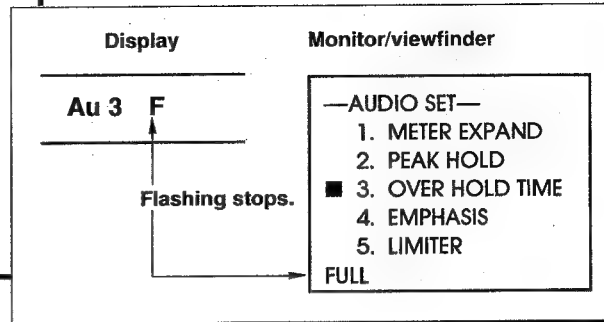
Display	Monitor/viewfinder
oP 3 01	—OPERATION SET1— 1. NOT USED 2. COLOR FRAME ■ 3. READY OFF TIME 4. READY OFF MODE 5. CHAR BATTERY 1 sec.

8 Entering the mode setting



Press this button.

The mode setting is entered when this is pressed.

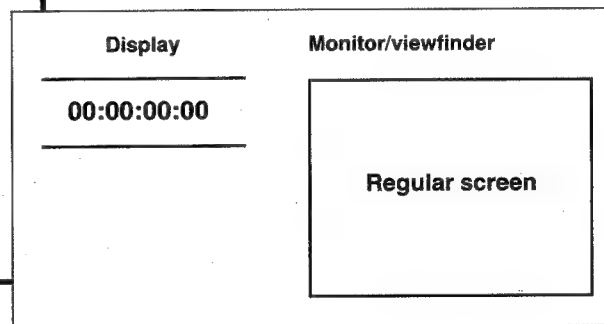


- If something has been entered by mistake, return to step 7 (by pressing the ADV button).
- To set another item, return to step 6 (by pressing the SHIFT button).
- To set another menu, return to step 3 (by pressing the MENU button).

9 Terminating the SET menu functions



Set this to "OFF".



■ When, after terminating the SET menu functions, the SET menu functions are used again before the power is turned off, the menu last set is displayed.

■ To superimpose the menu screen onto the monitor or viewfinder, set the TC SUPER switch at the right end inside the sub panel. (► P. 24)

■ Be sure to return the SET/DIAG switch to the "OFF" position after setting the SET menu.

SET Menu List

OPERATION SET menu 1

(The ▲ mark denotes the default setting.)

Monitor/viewfinder	Display	Description of function
1. NOT USED	—	—
2. COLOR FRAME 2F ▲ 4F (NTSC) 8F (PAL)	oP 2 2F ▲ oP 2 4F (NTSC) oP 2 8F (PAL)	This selects the color frame mode. 2F: Frame lock mode established 4F: Color frame lock mode established (NTSC) 8F: Color frame lock mode established (PAL)
3. READY OFF TIME 1 sec. 3 sec. 30 sec. 1 min. 3 min. ▲ 10 min. NONE	oP 3 01 oP 3 02 oP 3 03 oP 3 04 oP 3 05 ▲ oP 3 06 oP 3 07	This selects the time taken to transfer from the standby ON mode (STOP mode) to standby OFF (tape protection mode). 01: 1 sec. 02: 3 sec. 03: 30 sec. 04: 1 min. 05: 3 min. 06: 10 min. 07: Unlimited *This item is set using the FF/REW buttons.
4. READY OFF MODE DRUM STOP POWER SAVE ▲	oP 4 dS oP 4 PS ▲	This selects the standby OFF mode operation. dS: This stops the rotation of the drum. PS: This establishes the power save mode.
5. CHAR BATTERY ON ▲ OFF	oP 5 on ▲ oP 5 off	This turns ON/OFF the battery character display on the monitor or viewfinder. on: Battery character displayed off: Battery character not displayed

OPERATION SET menu 2

(The ▲ mark denotes the default setting.)

Monitor/viewfinder	Display	Description of function
6. CHAR REMAIN ON ▲ OFF	oP 6 on ▲ oP 6 oFF	This turns ON/OFF the remaining tape display on the monitor or viewfinder. on: Remaining tape displayed oFF: Remaining tape not displayed
7. CHAR AUDIO LEVEL ON OFF ▲	oP 7 on oP 7 oFF ▲	This turns ON/OFF the audio level character display on the monitor or viewfinder. on: Audio level character displayed oFF: Audio level character not displayed
8. CHAR WARNING ON ▲ OFF	oP 8 on ▲ oP 8 oFF	This turns ON/OFF the warning display on the monitor or viewfinder. on: Warning displayed oFF: Warning not displayed

TIME CODE SET menu

(The ▲ mark denotes the default setting.)

Monitor/viewfinder	Display	Description of function
1. VITC/LTC LTC ▲ VITC	tc 1 ▲	This selects the VITC/LTC mode. When VITC has been selected, "VITC" appears on the display.
2. DF/NDF (NTSC) DF ▲ NDF NO USED (PAL)	tc 2 dF ▲ tc 2 n dF	This selects the drop or non-drop frame mode (NTSC only). dF: Drop frame mode n dF: Non-drop frame mode
3. REAL TIME OFF ▲ LTC UB VITC UB BOTH	tc 3 00 ▲ tc 3 01 tc 3 10 tc 3 11	This selects the user's bit real-time mode. 00: Fixed value displayed both for LTC UB and VITC UB. 01: Real time for LTC UB; fixed value for VITC UB. 10: Real time for VITC UB; fixed value for LTC UB. 11: Real time displayed both for LTC UB and VITC UB.
4. REGEN ON ▲ OFF	tc 4 on ▲ tc 4 oFF	This turns the TCG regeneration mode ON/OFF. on: Regeneration mode ON oFF: Regeneration mode OFF
5. TCG CF FLAG ON ▲ OFF	tc 5 on ▲ tc 5 oFF	This turns the TCG CF flag ON/OFF. on: CF flag is set. oFF: CF flag is not set.
6. VITC POSITION (1) 10 (7) { 21 (23)	tc 6 10 (7) tc 6 21 (23) Default=14 (11)	This selects the lines where the VITC signal is inserted. Two lines are set. Do not select adjoining lines. *Figures in parentheses apply to PAL.
7. VITC POSITION (2) 10 (7) { 21 (23)	tc 7 10 (7) tc 7 21 (23) Default=16 (13)	This selects the lines where the VITC signal is inserted. Two lines are set. Do not select adjoining lines. *Figures in parentheses apply to PAL.

[NTSC only]■ **Drop frame (DF)**

Real-time deviations from color synchronization are corrected. Two frames (00 and 01) are skipped from the start of every integer minute except 0, 10, 20, 30, 40 and 50 minutes.

■ **Non-drop frame (NDF)**

Real-time deviations from color synchronization are not corrected.

■ **LTC (Longitudinal Time Code)**

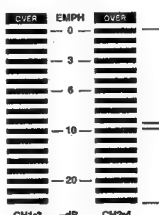
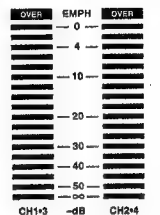
This is the time code which is recorded onto the track on the tape used exclusively for the time code.

■ **VITC (Vertical Interval Time Code)**

This time code is recorded in any two lines in the vertical blanking lines.

AUDIO SET menu

(The ▲ mark denotes the default setting.)

Monitor/viewfinder	Display	Description of function
1. METER EXPAND 20 dB 50 dB ▲	Au 1 20 Au 1 50 ▲	This sets the scale units of the AUDIO level meter on the display. 20: -20 dB (expanded) display 50: -50 dB (regular) display  
2. PEAK HOLD ON ▲ OFF	Au 2 on ▲ Au 2 oFF	This turns ON/OFF the peak hold function which holds the maximum (peak) audio level value on the display. on: Peak value is held on the display. oFF: Peak value is not held on the display.
3. OVER HOLD TIME SHORT ▲ FULL	Au 3 S ▲ Au 3 F	This set the time during which "OVER" lights up on the display when the audio input level is excessively high during recording. S: "OVER" lights up for 1.5 sec. from the moment when an excessively high level was input. F: Once an excessively high level has been input, "OVER" is kept lighted on the display.
4. EMPHASIS ON OFF ▲	Au 4 on Au 4 oFF ▲	This turns the emphasis function ON/OFF. on: Emphasis ON ("EMPH" lights on the display) The high-range components of the audio input signals are boosted and recorded. Only the components which were boosted are attenuated during playback so that the high-range noise occurring during playback can be suppressed. oFF: Emphasis OFF
5. LIMITER ON ▲ OFF	Au 5 on ▲ Au 5 oFF	This turns the audio limiter function ON/OFF. on: When an excessively high audio signal is input during recording, the limiter circuit is activated, and the signals are automatically recorded at the optimum level. oFF: The input signals are recorded in their original form.

BATTERY SET menu

(The ▲ mark denotes the default setting.)

Monitor/viewfinder	Display	Description of function
1. SELECT nicd 12 V nicd 13.2 V nicd 14.4 V silver	bA 1 ni 12 ▲ bA 1 ni 13 bA 1 ni 14 bA 1 si	This selects the type of battery to be used. ni 12: Nickel-cadmium battery (12 V) ni 13: Nickel-cadmium battery (13.2 V) ni 14: Nickel-cadmium battery (14.4 V) si : Silver-zinc battery *The remaining battery charge display differs according to the battery selected. (► P. 13)

- Select "nicd 13.2 V" or "nicd 14.4 V" on the BATTERY SET menu when the Anton Bauer intelligent batteries are used.

DIAG Menu Flow Chart

How to display the DIAG menu

- 1) Any mode except REC
- 2) TC SUPER switch→ON or CAMERA
- 3) SET/DIAG switch→DIAG
- 4) Press the MENU button.

■ Main menu 1

- DIAG MODE—
1. OPERATION
 2. BUS I/F
 3. SERVO & MECHA
 4. REC PROCESS

HOME SELECT FIX
(MENU) (SHIFT) (START)

■ Main menu 2

- DIAG MODE—
5. HOUR METER
 6. ERROR RATE
 7. TRACKING
 8. POWER

HOME SELECT FIX
(MENU) (SHIFT) (START)

(Use the START button to display the sub menus.)

■ OPERATION DIAG menu

- OPERATION DIAG—
1. KEY SW
 2. LCD & LED
 3. NOT USED
 4. NOT USED

■ BUS I/F DIAG menu

- BUS I/F DIAG—
1. REC LSI
 2. RAM
 3. PB LSI

■ SERVO MECHA DIAG menu

- SERVO MECHA DIAG—
1. CASSETTE SENSOR
 2. POSITION SENSOR
 3. TAPE SENSOR
 4. TENSION SENSOR
 5. SERIAL I/F
 6. DRUM SERVO
 7. CAPSTAN SERVO
 8. COLOR FRAME
 9. REEL MOTOR
 10. S BREAK SOLENOID
 11. T BREAK SOLENOID
 12. PINCH SOLENOID
 13. CLEANING SOL
 14. LOAD/UNLOAD

■ REC PROCESS DIAG menu

- REC PROCESS DIAG—
1. REC DATA
 2. AUDIO PLL LOCK
 3. FE CURRENT
 4. RF

- 1) Use the SHIFT button to check the next item.
- 2) Use the ADV button to select the mode.
- 3) Use the START button to start automatic check.

(Use the START button to display the sub menus.)

■ HOUR METER DIAG menu

- HOUR METER DIAG—
1. DRUM ON TIME
 2. POWER ON TIME
 3. TAPE RUN TIME
 4. LOADING TIMES
 5. EEPROM WR TIMES

■ ERROR RATE DIAG menu

- ERROR RATE DIAG—
1. TOTAL ERROR

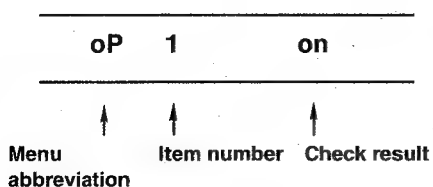
■ TRACKING menu

- TRACKING—
1. TRACKING

■ POWER DIAG menu

- POWER DIAG—
1. POWER 1
 2. POWER 2

■ The check mode appears on the display.



■ Menu abbreviations

- oP: OPERATION DIAG menu
 bU: BUS I/F DIAG menu
 SE: SERVO & MECHA DIAG menu
 rE: REC PROCESS DIAG menu
 Ho: HOUR METER DIAG menu
 Er: ERROR RATE DIAG menu
 tr: TRACKING menu
 Po: POWER DIAG menu

DIAG Menu Function Operations

1

Set the unit to any mode except REC.

2

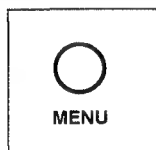
Selecting the DIAG menu function



Set this to "DIAG".

3

Transfer to DIAG mode



Press this button.

The main menu appears.

Display

oP

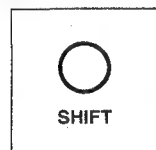
Monitor/viewfinder

—DIAG MODE—

- 1. OPERATION
- 2. BUS I/F
- 3. SERVO & MECHA
- 4. REC PROCESS
- HOME SELECT FIX
- (MENU) (SHIFT) (START)

4

Selecting the menu



Press this button.

A menu is selected each time this button is pressed.

Display

Ho

Monitor/viewfinder

—DIAG MODE—

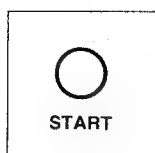
- 5. HOUR METER
- 6. ERROR RATE
- 7. TRACKING

HOME SELECT FIX
(MENU) (SHIFT) (START)

Menus

6

5 Transfer to selected menu



Press this button.

The sub menu appears.

Display

oP 1

Monitor/viewfinder

—OPERATION DIAG—

- 1. KEY SW
- 2. LCD & LED
- 3. NOT USED
- 4. NOT USED

PLAY

- The operations activated by the following buttons differ depending on which menu has been selected. (Refer to the items in the DIAG menu list. ➡ P. 45–53)
 - Basically, the operations activated are as listed below.
 - MENU button: To return to the main menu
 - SHIFT button: To check the next item
 - ADV button: To select the item among those items selected by the SHIFT button
 - START button: To start the automatic check in sequence from the present item (BUS I/F, SERVO & MECHA and REC PROCESS menus only)
- In the event of NG, the automatic check stops at the item concerned.

6 Terminating the DIAG menu function



Set this to "OFF".

Display

00:00:00:00

Monitor/viewfinder

Regular screen

- When, after terminating the DIAG menu functions, the DIAG menu functions are used again before the power is turned off, the menu last set is displayed.
- To superimpose the menu screen onto the monitor or viewfinder, set the TC SUPER switch at the right end inside the sub panel. (➡ P. 24)

DIAG Menu List

OPERATION DIAG menu

Monitor/viewfinder	Bottom left of monitor/viewfinder	Display	Description of function
1. KEY SW	PLAY REC STOP PAUSE FF REW EJEC RESET HOLD	oP-1	When this item is selected by the SHIFT button, the indicator of the last pressed function button appears at the bottom left of the monitor/viewfinder.
2. LCD & LED	1. LCD 2. WARNING LED 3. STATUS LED	All LCDs and LEDs light up on the display Warning lamp lights All status LEDs (above the control buttons and DIGITAL LED) light	Use the ADV button to check that what has been selected lights up.
3. NOT USED	—	—	—
4. NOT USED	—	—	—

■ Operations on this menu screen:

- 1) Press the SHIFT button to select the items.
- 2) Press the ADV button to select what is to be checked.

BUS I/F DIAG menu

Monitor/viewfinder	Bottom left of monitor/viewfinder	Display	Description of function
1. REC LSI	OK NG1~NG8 All the NG numbers are indicated for the trouble locations.	bU 1 O bU 1 F	This checks the read/write status of the REC LSI. OK: Normal NG1: Trouble with NSTD NG2: Trouble with REC DATA IC NG3: Trouble with user's bit NG4: Trouble with MOD 8/14 IC NG5: Trouble with REC CTRL IC NG6: Trouble with PCM REC IC NG7: Trouble with AUDIO TCG IC NG8: Trouble with AUDIO PIO
2. RAM	1. OK 2. NG1	bU 2 O bU 2 F	This checks the read/write status of the dual port RAM. OK: Normal NG1: Trouble
3. PB LSI	OK NG1~NG6 All the NG numbers are indicated for the trouble locations.	bU 3 O bU 3 F	This checks the read/write status of the PB LSI. OK: Normal NG1: Trouble with playback microcomputer NG2: Trouble with CH0 CH PB IC NG3: Trouble with CH1 CH PB IC NG4: Trouble with PB CTRL IC NG5: Trouble with SYNC ROM IC NG6: Trouble with PCM PB IC

■ Operations on this menu:

- 1) When the menu is opened, the checking of the first item is started.
- 2) When the SHIFT button is pressed, the next item is checked.
- 3) When the START button is pressed, the automatic checking of the items is started in sequence from the present item.
(In the event of NG, the automatic check stops at the item concerned.)

- 4) The results of the check are displayed at the bottom left of the monitor/viewfinder.

SERVO & MECHA DIAG menu

Monitor/viewfinder	Bottom left of monitor/viewfinder	Display	Description of function
1. CASSETTE SENSOR	OK NG1~NG6 All the NG numbers are indicated for the trouble locations.	SE 1 O SE 1 F	This checks the photo sensors for the cassette. OK: Normal NG1: Trouble with all recording prevention sensors NG2: Trouble with VIDEO/CTL recording prevention sensor NG3: Trouble with spare sensor NG4: Trouble with hub diameter detection sensor NG5: Trouble with tape thickness detection sensor NG6: Trouble with spare sensor
2. POSITION SENSOR	OK NG1~NG3 All the NG numbers are indicated for the trouble locations.	SE 2 O SE 2 F	This checks the position sensors. OK: Normal NG1: Trouble with loading completion detection sensor NG2: Trouble with unloading completion detection sensor NG3: Trouble with eject detection sensor
3. TAPE SENSOR	OK NG1~NG2 All the NG numbers are indicated for the trouble locations.	SE 3 O SE 3 F	This checks the tape start/end detection sensors. OK: Normal NG1: Trouble with tape start detection sensor NG2: Trouble with tape end detection sensor
4. TENSION SENSOR	OK NG1	SE 4 O SE 4 F	This checks the tension sensor. OK: Normal NG1: Trouble

■ Operations on this menu:

- 1) When the menu is opened, the checking of the first item is started.
- 2) When the SHIFT button is pressed, the next item is checked.
- 3) When the START button is pressed, the automatic checking of the items is started in sequence from the present item.
(In the event of NG, the automatic check stops at the item concerned.)

- 4) The results of the check are displayed at the bottom left of the monitor/viewfinder.

SERVO & MECHA DIAG menu (continued)

Monitor/viewfinder	Bottom left of monitor/viewfinder	Display	Description of function
5. SERIAL I/F	OK NG1	SE 5 O SE 5 F	This checks the serial communication between the servo and system control. OK: Normal NG1: Trouble with serial interface
6. DRUM SERVO	OK NG1~NG4 All the NG numbers are indicated for the trouble locations.	SE 6 O SE 6 F	This checks the drum servo. OK: Normal NG1: Trouble with drum servo lock NG2: Trouble with drum FG NG3: Trouble with drum PG NG4: Trouble with frame pulses
7. CAPSTAN SERVO	OK NG1~NG3 All the NG numbers are indicated for the trouble locations.	SE 7 O SE 7 F	This checks the capstan servo. OK: Normal NG1: Trouble with capstan servo lock NG2: Trouble with capstan FG NG3: Trouble with frame pulses
8. COLOR FRAME	OK NG1~NG4 All the NG numbers are indicated for the trouble locations.	SE 8 O SE 8 F	This checks the color frame lock. OK: Normal NG1: Trouble with CF lock NG2: Trouble with REC CTL NG3: Trouble with frame pulse/2 NG4: Trouble with frame pulse/4 (PAL)
9. REEL MOTOR	OK NG1~NG2 All the NG numbers are indicated for the trouble locations.	SE 9 O SE 9 F	This checks the supply and take-up reel circuits. OK: Normal NG1: Trouble with supply reel FG NG2: Trouble with take-up reel FG

■ Operations on this menu:

- 1) When the SHIFT button is pressed, the next item is checked.
- 2) When the START button is pressed, the automatic checking of the items is started in sequence from the present item.
(In the event of NG, the automatic check stops at the item concerned.)
- 3) The results of the check are displayed at the bottom left of the monitor/viewfinder.

SERVO & MECHA DIAG menu (continued)

Monitor/viewfinder	Bottom left of monitor/viewfinder	Display	Description of function
10. S BREAK SOLENOID	OK NG1~NG4 All the NG numbers are indicated for the trouble locations.	SE 10 O SE 10 F	This checks the brake solenoid of the supply reel. OK: Normal NG1: Trouble with supply brake ON operation NG2: Trouble with supply brake OFF operation NG3: Trouble with supply brake ON command NG4: Trouble with supply brake OFF command
11. T BREAK SOLENOID	OK NG1~NG4 All the NG numbers are indicated for the trouble locations.	SE 11 O SE 11 F	This checks the brake solenoid of the take-up reel. OK: Normal NG1: Trouble with take-up brake ON operation NG2: Trouble with take-up brake OFF operation NG3: Trouble with take-up brake ON command NG4: Trouble with take-up brake OFF command
12. PINCH SOLENOID	OK NG1~NG2 All the NG numbers are indicated for the trouble locations.	SE 12 O SE 12 F	This checks the pinch solenoid. OK: Normal NG1: Trouble with pinch ON command NG2: Trouble with pinch OFF command
13. CLEANING SOL	OK NG1	SE 13 O SE 13 F	This checks the solenoid of the cleaning mechanism. OK: Normal NG1: Trouble with cleaning solenoid ON command
14. LOAD/UNLOAD	OK NG1~NG4 All the NG numbers are indicated for the trouble locations.	SE 14 O SE 14 F	This checks the tape-less loading and unloading. OK: Normal NG1: Trouble with loading operation NG2: Trouble with unloading operation NG3: Trouble with loading motor ON command NG4: Trouble with motor direction command

■ Operations on this menu:

- 1) When the SHIFT button is pressed, the next item is checked.
- 2) When the START button is pressed, the automatic checking of the items is started in sequence from the present item.
(In the event of NG, the automatic check stops at the item concerned.)
- 3) The results of the check are displayed at the bottom left of the monitor/viewfinder.

REC PROCESS DIAG menu

Monitor/viewfinder	Bottom left of monitor/viewfinder	Display	Description of function
1. REC DATA	OK NG1	rE 1 O rE 1 F	This checks the bus interface in the REC signal processing circuit. OK: Normal NG1: Trouble with VIDEO data
2. AUDIO PLL LOCK	OK NG1~NG2 All the NG numbers are indicated for the trouble locations.	rE 2 O rE 2 F	This checks the audio PLL locking. OK: Normal NG1: Trouble with PLL LOCK 1 NG2: Trouble with PLL LOCK 2
3. FE CURRENT	OK NG1	rE 3 O rE 3 F	This checks the full erase current. OK: Normal NG1: Trouble with full erase current
4. RF	OK NG1~NG4 All the NG numbers are indicated for the trouble locations.	rE 4 O rE 4 F	This checks the RF level which is detected during recording/playback. OK: Normal NG1: Trouble with CH0A level NG2: Trouble with CH0B level NG3: Trouble with CH1A level NG4: Trouble with CH1B level

■ Operations on this menu:

- 1) When the menu is opened, the checking of the first item is started.
- 2) When the SHIFT button is pressed, the next item is checked.
- 3) When the START button is pressed, the automatic checking of the items is started in sequence from the present item.
(In the event of NG, the automatic check stops at the item concerned.)

- 4) The results of the check are displayed at the bottom left of the monitor/viewfinder.

HOURLY METER DIAG menu

Monitor/viewfinder	Bottom left of monitor/viewfinder	Display	Description of function
1. DRUM ON TIME	#### HOUR (0 to 9999 hours)	Ho 1 # # # (001 to 099× 100 hours)	This indicates the total drum rotation time.
2. POWER ON TIME	#### HOUR (0 to 9999 hours)	Ho 2 # # # (001 to 099× 100 hours)	This indicates the total power ON time.
3. TAPE RUN TIME	#### HOUR (0 to 9999 hours)	Ho 3 # # # (001 to 099× 100 hours)	This indicates the total tape running time.
4. LOADING TIMES	#### (0 to 99999 times)	Ho 4 # # # (001 to 999× 100 times)	This indicates the total number of loading times.
5. EEPROM WR TIMES	#### (0 to 9999 times) Display flashes above 9000	Ho 1 # # # (001 to 999× 100 times)	This indicates the total number of times data has been stored in the EEPROM.

■ Operations on this menu:

- 1) Press the SHIFT button to select the item to be checked.
- 2) The operation time or operation count is displayed at the bottom left of the monitor/viewfinder.

ERROR RATE DIAG menu

1. Monitor/viewfinder	Bottom left of monitor/viewfinder	Display	Description of function
1. TOTAL ERROR	GOOD HIGH ERROR CONCEAL	Er 1	<p>This indicates the total video and audio error rate.</p> <p>The error rate is indicated in three levels.</p> <p>GOOD: Acceptable HIGH ERROR: Many errors CONCEAL: Errors rectified</p> <p>Operations</p> <ol style="list-style-type: none"> 1) Set the unit to the playback mode. 2) The error rate appears on the audio level meter display.

TRACKING menu

Monitor/viewfinder	Bottom left of monitor/viewfinder	Display	Description of function
1. TRACKING	<<■>>	tr 1	<p>This varies the tracking value during playback. The RF envelope level CH0 and CH1 are indicated on the audio level meter of the display.</p> <p>Operations</p> <ol style="list-style-type: none"> 1) Set the unit to the playback mode. 2) Upon completion of optimizing, press the FF or REW button to change the tracking value. <p>■: Tracking optimized ■>: Higher than optimized value <■: Lower than optimized value <<■>>: Tracking adjustment in progress</p>

■ Error rate:

"HIGH ERROR" is within the correction range of the error correction circuit. "CONCEAL" is outside this range and so the errors are compensated by the error compensation circuit, but this leaves the picture disturbed slightly. Proceed to clean the heads and replace the tape.

■ Optimizing:

"Optimizing" denotes setting the tracking value to its optimum value. This setting is done automatically once when the unit is first set to the PLAY mode after a cassette has been loaded or after the power has been turned back on. It takes about 4 seconds to optimize the value.

POWER DIAG menu

Monitor/viewfinder	Bottom left of monitor/viewfinder	Display	Description of function
POWER 1	OK NG1~NG8	Po 1 O Po 1 F	<p>This checks the voltages of the recording system.</p> <p>OK: OK NG1: Something wrong with recording system +5 V NG2: Something wrong with recording system -5 V NG3: Something wrong with recording system +9 V NG4: Something wrong with recording system -9 V NG5: Something wrong with recording system -2 V NG6: Something wrong with recording system +6.5 V NG7: Something wrong with recording system +16 V NG8: Something wrong with recording system +48 V</p> <p>●Only the system in which something went wrong first is displayed.</p>
POWER 2	OK NG1~NG8	Po 2 O Po 2 F	<p>This checks the voltages of the playback and digital systems.</p> <p>OK: OK NG1: Something wrong with playback system +5 V NG2: Something wrong with playback system -5 V NG3: Something wrong with playback system +9 V NG4: Something wrong with playback system -9 V NG5: Something wrong with playback system -2 V NG6: Something wrong with playback system +6.5 V NG7: Something wrong with digital system +5 V NG8: Something wrong with digital system -5 V</p> <p>●Only the system in which something went wrong first is displayed.</p>

■ Operations on this menu:

- 1) When this menu is opened, the check of the first item is commenced.
- 2) When the SHIFT button is pressed, the next item is checked.
- 3) The check results appear at the bottom left of the monitor/viewfinder.
(Only the system in which something went wrong first is displayed.)

Warning Systems

Video input warning display

This flashes when a video signal has not been supplied. Check the connections and the selection of the input signal switches.

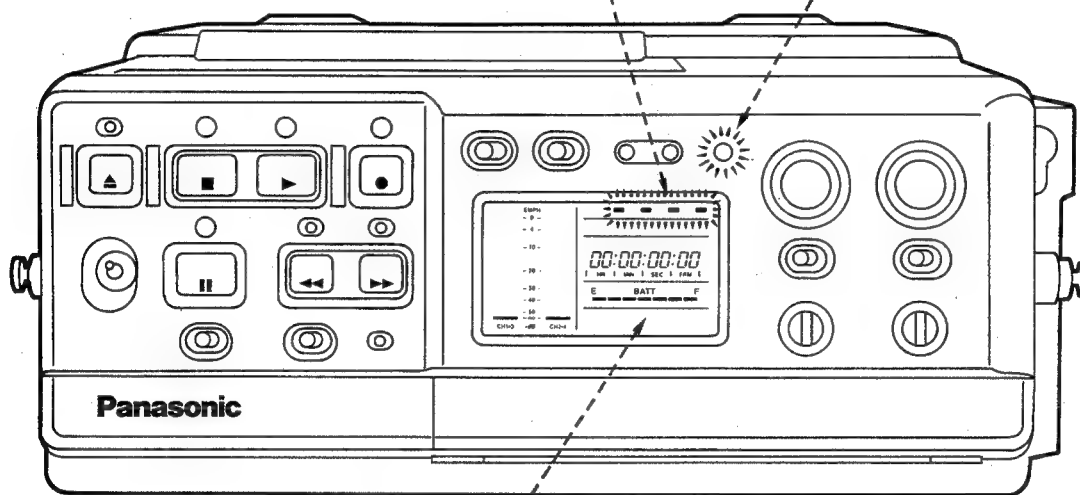
The following display appears on the monitor/viewfinder.

Monitor/viewfinder

NO VIDEO INPUT

Warning lamp

This flashes when the warning display appears on the display panel.



Warning display

When a malfunction occurs, the corresponding warning display lights.

RF	SERVO	HUMID
SLACK	END	INHIBIT

Refer to the following page for details on warning displays.

- The warning lamp flashes even when the battery voltage has dropped. (➡ P. 13)

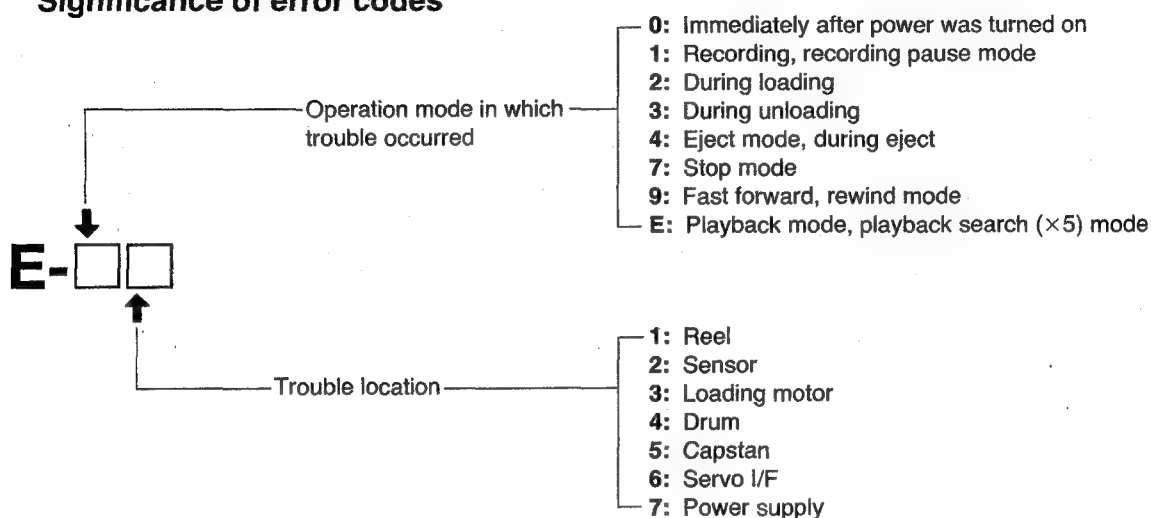
Warning displays

Display	Monitor/viewfinder	Alarm	Warning lamp	Description
RF	RF	Sounds	Flashes	No recording possible due to dirty heads or deterioration in the cassette. Remedy: Replace cassette or clean heads.
SERVO	SERVO	Sounds	Flashes	Drum/capstan servo is not locked.
HUMID	HUMID	Sounds	Flashes	Dew has formed on tape transport system inside VTR. Remedy: Keep power on and wait until HUMID display clears.
SLACK	SLACK	Sounds	Flashes	Some malfunction or other has occurred inside VTR. All motors are stopped in order to protect the tape. The error code which identifies the error location appears on the display panel. (➡ P. 56)
END	3-2M	Does not sound	Flashes	Warning lamp flashes when tape is 3 minutes away from its end during recording. The amount of tape remaining appears on the monitor/viewfinder. (➡ P. 56)
INHIBIT		Does not sound	Off	The cassette's accidental erasure prevention pin has been set for recording. (➡ P. 21) • If a function button is pressed when the KEY INHIBIT switch has been set to ON, the INHIBIT display lights for 5 seconds. (➡ P. 8)

Slack (SLACK display)

When tape slack develops, all the motors stop operating and an error code appears on the display panel.

If the error is not released even when the eject operation is performed or the power is switched off and then switched back on again, check the error code, turn off the power and contact your dealer immediately.

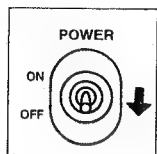
Significance of error codes**Remaining tape warning (END display)**

Remaining tape time	Warning lamp	Display	Monitor/viewfinder
15 to 10 min.	OFF		15-10M (displayed for several seconds)
10 to 5 min.	OFF	—	10-5M (displayed for several seconds)
5 to 3 min.	OFF	—	5-3M (displayed for several seconds)
3 to 2 min.	Flashes	END display lights	3-2M (displayed continuously)
2 to 1 min.	Flashes	END display lights	2-1M (displayed continuously)
Under 1 min.	Flashes	END display lights	1-0M (displayed continuously)

Emergency Eject

If the cassette cannot be removed even when the EJECT button is pressed, follow the steps below and take out the cassette.

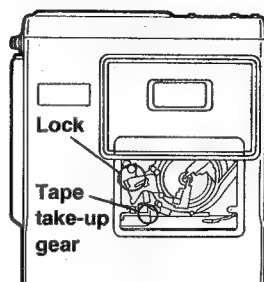
1



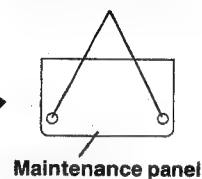
Set this to "OFF".

2

Open the maintenance panel. (→ below)

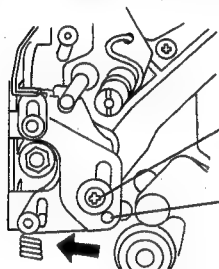


Undo these screws and remove them.



3

Release the lock using a screwdriver.

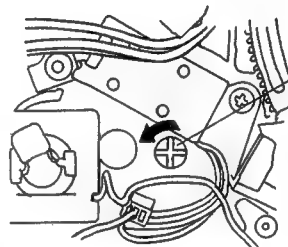


1) Loosen the screw.

2) Move this in the direction of the arrow.

4

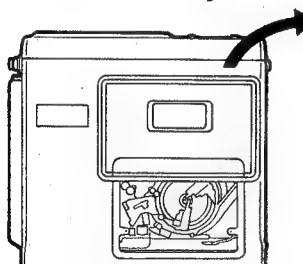
Turn the tape take-up gear using a screwdriver.



Turn this in the direction of the arrow.

5

When all the tape has been taken up, the cassette is ejected.



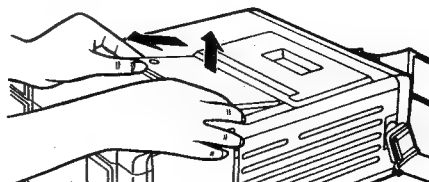
Take out the cassette.

6

- 1) Engage the lock again.
- 2) Turn the tape take-up gear clockwise a little.
- 3) Close the maintenance panel.
- 4) Press down on the cassette holder.

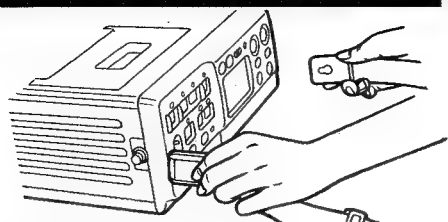
- Do not operate this unit while the maintenance panel is open.
- Use the emergency eject procedure only in an emergency.

- To remove the maintenance panel, pull it up gently and then pull it toward you. (The panel may break if it is forcibly pulled up.)



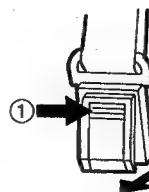
Shoulder Belt Mounting/Handling Precautions

How to mount the shoulder belt



Insert the ends into the pins on the left and right side panels and pull toward you until you hear a click.

How to detach the shoulder belt



Push down on ①, open the catch and disengage the ends from the pins.

Handling precautions

- Do not use in a very hot or humid location.
- Keep water away from the unit.
- Do not block the ventilation holes.
- Do not disassemble the unit.
- Do not put any objects inside the unit.
- Stop operating the unit immediately should smoke, unusual sounds or strange odors be found to emanate from the unit.
- Do not subject the unit to impacts.
- Be sure to disconnect the cables first before moving the unit.

When installing the unit:

- Install it in a flat and stable location.
- Do not install it where it will be exposed to direct sunlight for prolonged periods of time.
- Do not place heavy objects on top of the unit.
- Do not install it where it will be exposed to strong electrical or magnetic fields.

When storing the unit:

- Be sure to take out the cassette.
- Switch off the unit's power.
- Take out the battery packs.
- Do not store the unit in a very hot or humid location.

Cleaning the main unit

- Remove dirt on the unit using a soft cloth. Remove stubborn stains using a cloth dipped in diluted neutral detergent and then be sure to wipe dry.
- Do not use benzene or paint thinners to clean the unit. They may discolor the unit or cause its paint to peel off.

Cleaning the heads

When the heads need to be cleaned, obtain the AJ-TDCLS cleaning cassette (option). Since improper use may damage the heads, read through the operating instructions which accompany the cleaning cassette.

- When using the shoulder belt, make sure that the belt is secured properly before attempting to lift the VTR.

Connector Signals

CAMERA IN connector (26 pins)

Pin No.	Signal
1	COMPOSITE VIDEO
2	COMPOSITE VIDEO GND
3	_____
4	_____
5	(SERIAL I/F VIDEO)
6	(SERIAL I/F VIDEO GND)
7	_____
8	_____
9	CAMERA MIC (H)
10	CAMERA MIC (C)
11	CAMERA MIC (G) GND
12	VTR START/STOP
13	_____
14	TAPE REMAIN
15	REC/TALLY/WARNING
16	_____
17	SHIELD
18	PLAYBACK VIDEO
19	PLAYBACK VIDEO GND
20	VTR SAVE/AUDIO MONITOR
21	_____
22	_____
23	_____
24	_____
A	POWER +12 VDC
B	POWER GND

AUDIO INPUT/OUTPUT connectors (XLR 3 pins)

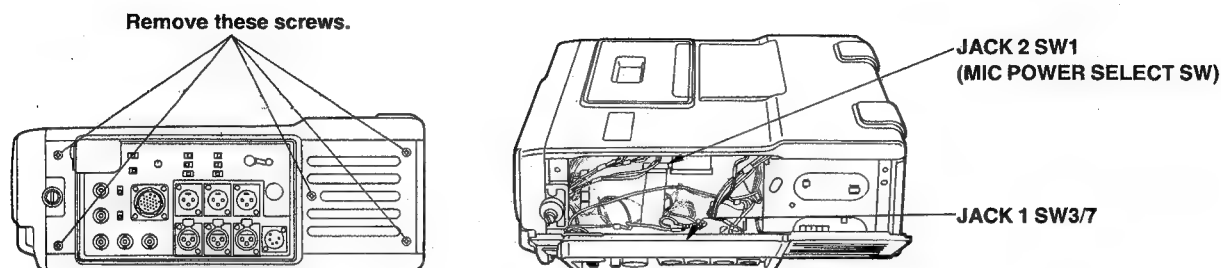
Pin No.	Signal
1	GND
2	HOT
3	COLD

EXT. DC IN connector (XLR 4 pins)

Pin No.	Signal
1	GND
2	_____
3	_____
4	+12

Circuit Boards

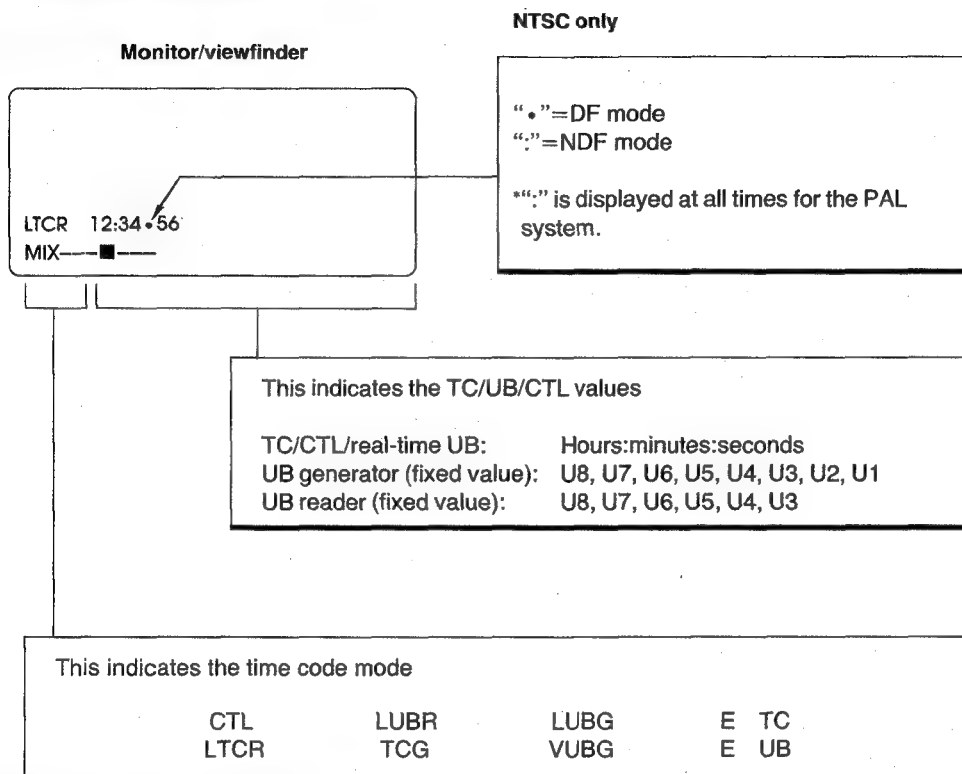
Locations of circuit boards



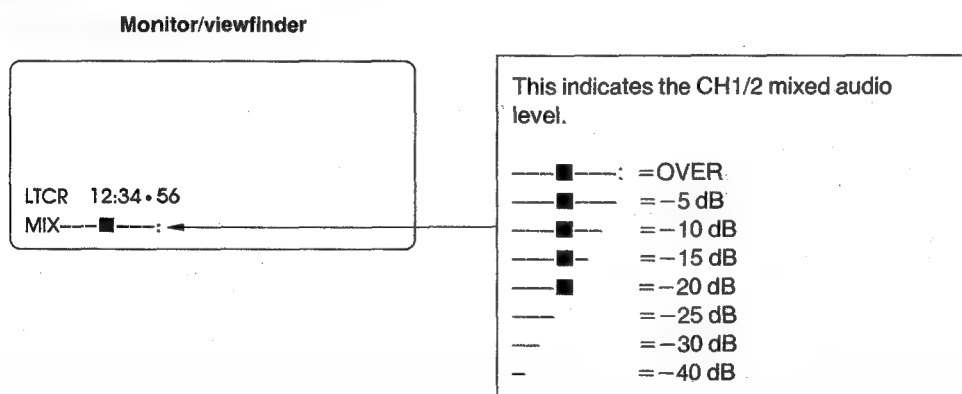
Circuit board	Switch	Name	Description	Default setting
JACK 2 board	SW1	Phantom power switch (MIC POWER SELECT SW)	This selects the supply voltage for the phantom microphone. P48: +48 V phantom power P12: +12 V phantom power	+48 V
JACK 1 board	SW3	Microphone sensitivity switch CH1	This is set to the position corresponding to the microphone's sensitivity, −40 dB or −60 dB .	−60 dB
	SW7	Microphone sensitivity switch CH2		

Superimpose Displays

Time code superimposing



Audio level superimposing



■ In addition to the time code and audio level, the warning displays (➡ P. 55), amount of tape remaining (➡ P. 56), and remaining battery charge (➡ P. 13) are also indicated.

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MEMO

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Service Manual

*Maintenance
Procedures
Mechanical
Adjustments*

Mechanical Adjustment

Panasonic
Broadcast Systems

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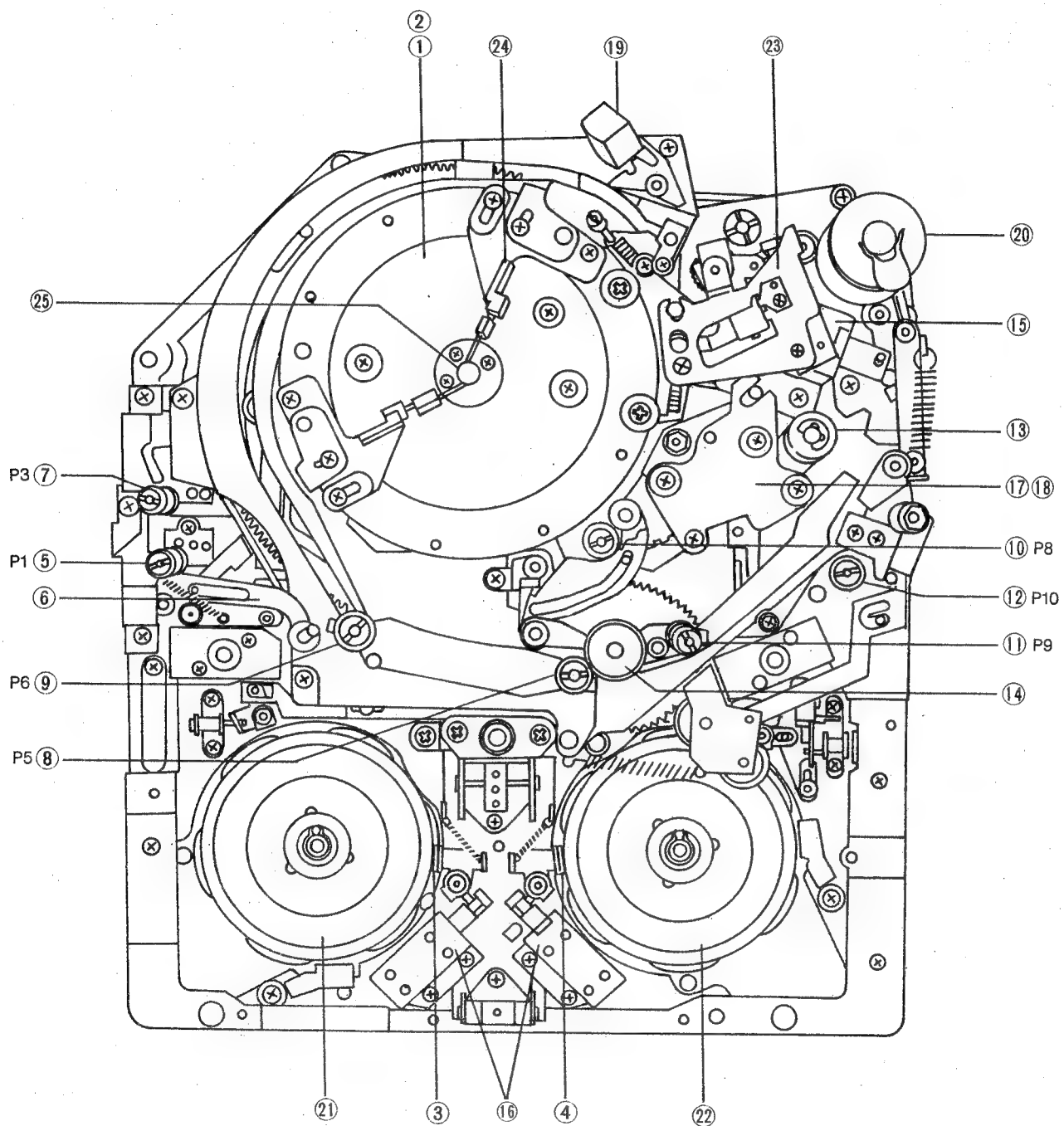
MAINTENANCE AND MECHANICAL ADJUSTMENT PROCEDURES

1. AJ-D320 Maintenance Parts Chart and Parts Location

Location No.	Name	Part Number	Using Hour							
			500	1000	1500	2000	2500	3000	3500	4000
1	Center Drum Unit	VEH0605(PAL) VEH0606(NTSC)	500hr and Measure 250hr each							
2	Drum Unit	VEG1033 (PAL) VEG1034 (NTSC)								●
3	Supply Brake Unit	VXL2175		△		●		△		●
4	Take Up Brake Unit	VXL2176		△		●		△		●
5	P1 Post Roller	VXP0936								●
6	Tension Arm Unit	VXL2167								●
7	P3 Post Roller	VXP0936								●
8	P5 Post Roller	VXP0936								●
9	P6 Post Roller	VXP0937								●
10	P8 Post Roller	VXP0936								●
11	P9 Post Roller	VXP0936								●
12	P10 Post Roller	VXP0936								●
13	Capstan Unit	VEM0414				●				
14	Pinch Roller Unit	VXL2168	○	●	○	●	○	●	○	●
15	Pinch Solenoid Unit	VEK5700								●
16	Brake Solenoid	VSJ0104								●
17	A/C Head Unit	VBR0177				●				●
18	MR Head Unit	VED0173				●				●
19	FE Head Unit	VBS0040-1				●				●
20	Loading Motor Unit	VEM0411								●
21	Supply Reel Unit	VXR0151								●
22	Take Up Reel Unit	VXR0151								●
23	Cleaner Roller Unit	VXP1326		●		●		●		●
24	Brush Unit	VXS0108		●		●		●		
25	Slipling	VSA0082				●				
26	E·EJECT Leaf SW	VSH0026								●

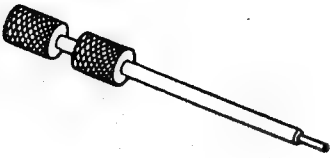
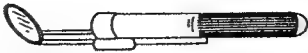
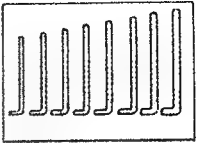
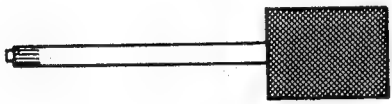



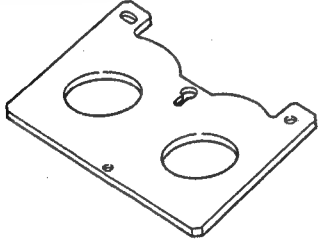
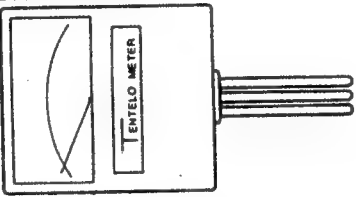
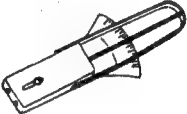
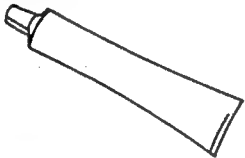
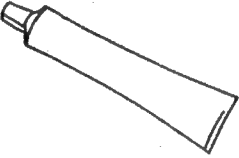
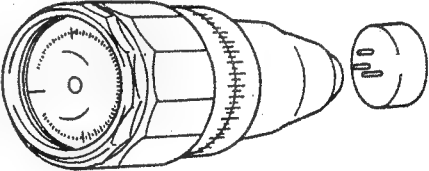
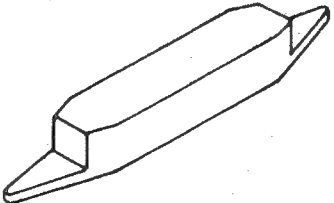
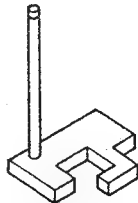
Remark ; ● : Replacement, ○ : Confirmation or Adjustment, △ : Cleaning

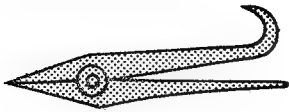
* Center Drum adjustment procedures informed by Technical Information.



The specified fixtures and tools must be used to conduct adjustment requiring a fixture.

The following fixtures and tools are required to conduct complete Mechanical Adjustments.

Servicing Fixtures & Tools (for Field Adjustment)		
1 VFK0293 Post Driver 	2 VFK0343 (or purchase locally) Check Light 	3 VFK0326 (or purchase locally) Hex. Wrench Set  Gosho's Hex. keys No. 505-G 1.27, 1.5, 2.0, 2.5, 3.0
4 VFK0446 Fine Adjustment Screw Driver (3mmφ) 	5 VFK0357 (φ1.5) 6 VFK0358 (φ2) Eccentric Screwdriver 	7 VFK0676 (or purchase locally) Nut Driver (7 mm)  7mm 
8 VFK0761 D320 Mech Neutral Plate 	9 VFK0132 Back Tension Meter  Tentelo Meter Model: T2-H7-UM (7 ounces, 200 grams)	10 VFK0758 Fan Type Tension Gauge  (±2000 grams max.)
11 M0R265 Morlytone Grease (Black) (for metal part) 	12 VFK0749 Froiral Grease (White) (for plastic part) 	13 VFK71 (150g max.), 14 VFK0133 (1200g max.) Dial Torque Gauge VFK0134 Dial Torque Gauge Adaptor 
15 VFM6080EC 16 VFM6081EC } NTSC VFM6086EC } VFM6180EC } PAL VFM6181EC } VFM6186EC } Alignment Tape	17 VFK0363 Post Height Fixture 	18 VFK0760 D320 P2 Tension Post Gain Adjustment Tool 

19	VFK0335 Retaining Ring Remover	20	VFK0854  Rec Head PB P.C.Board	
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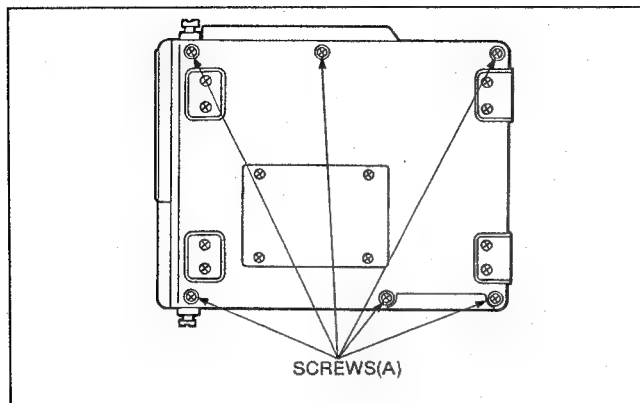
* : Factory Adjustment only

No.	Name	Part No.	Purpose
1	Post Driver	VFK0293	Post height adjustment
2	Check Light	VFK0343	Tape transport check
3	Hex. Wrench M2	VFK0326 (Set)	Tension Magnet height adjustment
	Hex. Wrench M2.6	VFK0326 (Set)	* 1. Inclined Post inclined angle adjustment (1) 2. Tension adjustment (Fine)
	Hex. Wrench M3	VFK0326 (Set)	
4	Fine adjustment screwdriver	VFK0446	1. Loading Completion SW adjustment 2. Unloading Completion SW adjustment 3. Sub-loading Completion SW adjustment 4. Sub-unloading Completion SW adjustment 5. Pinch Press lever Position adjustment
5	Eccentric Screwdriver (Ø1.5)	VFK0357	Tension adjustment (Coarse)
6	Eccentric Screwdriver (Ø2)	VFK0358	1. Pinch Solenoid Position adjustment 2. Drum Cleaner Unit adjustment 3. A/C Head X Value adjustment
7	Box Wrench M4 Nut (7mm)	Purchase Locally	A/C Head Height adjustment
8	Mech Neutral Adjustment Plate	VFK0761	Post Height adjustment
9	Back Tension Meter	VFK0132	Tension Adjustment
10	Fan Type Tension Gauge	VFK0758	Pinch Torque adjustment
11	Morlytone Grease (Black)	MOR265	Grease up for metal part
12	Froiral Grease (White)	VFK0749	Grease up for plastic part
*13	Dial Torque Gauge (150g)	VFK71	1. Take-up Reel Torque adjustment 2. Supply Reel Torque adjustment
14	Dial Torque Gauge (1200g) Dial Torque Gauge Adapter	VFK0133 VFK0134	
15,16	Alignment Tape	VFK6186EC VFK6180EC VFK6181EC	Electrical Adjustment Tape Linearity Tape
*17	Post Height Fixture	VFK0363	Post Height adjustment
18	P2 Tension Post Gain Adj Tool	VFK0760	P2 Tension Post Gain adjustment
19	Retaining Ring Remover	VFK0335	Retaining Ring Removal
20	Rec Head PB P.C.Board	VFK0854	A/C Head Horizontal Position adjustment

2. DISASSEMBLY METHOD

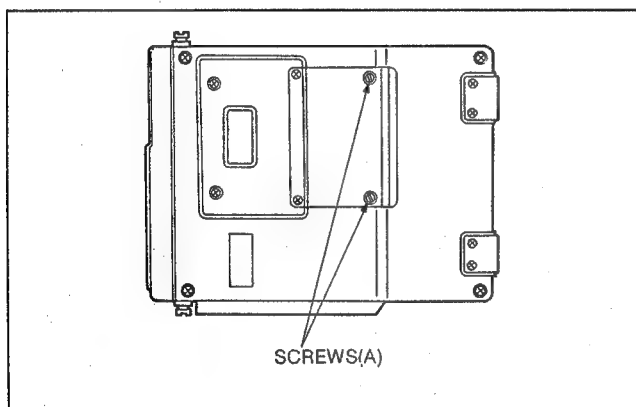
2-1. BOTTOM PANEL REMOVAL

1. Unscrew the 6 screws (A) and open the bottom panel.



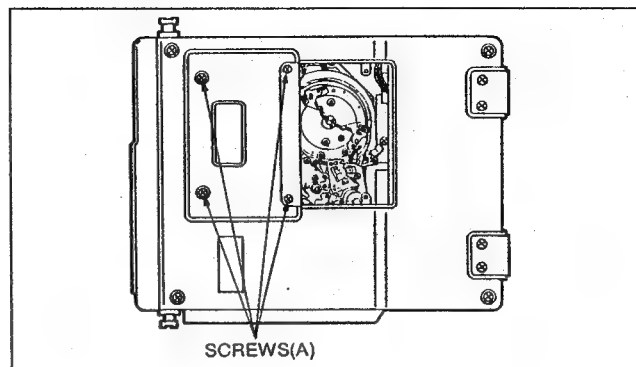
2-2. SERVICE COVER REMOVAL

1. Unscrew the 2 screws (A) and remove the service cover.

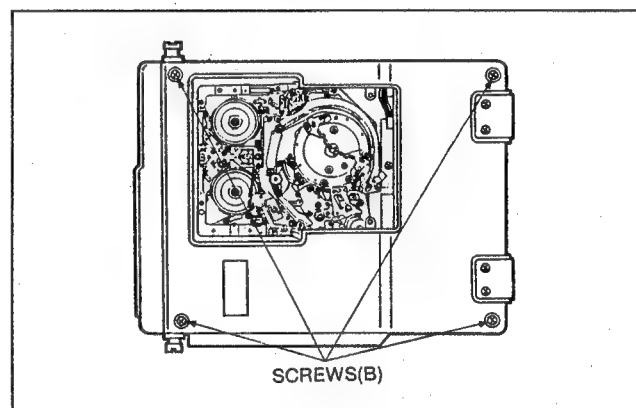


2-3. CASSETTE COVER AND TOP PANEL REMOVAL

1. Unscrew the 4 screws (A) and remove the cassette cover.

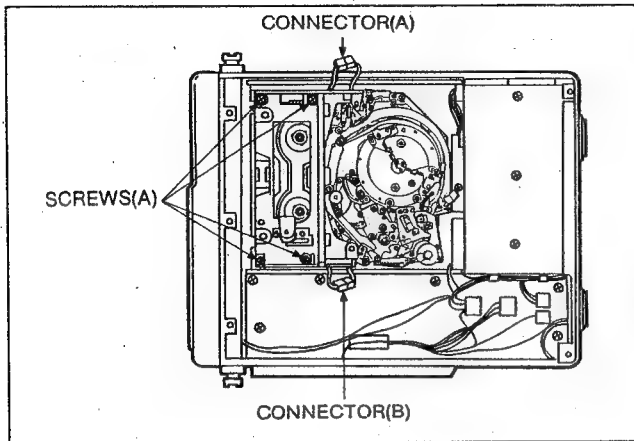


2. Unscrew the 4 screws (B) and remove the top panel.



2-4. CASSETTE CARRIAGE REMOVAL

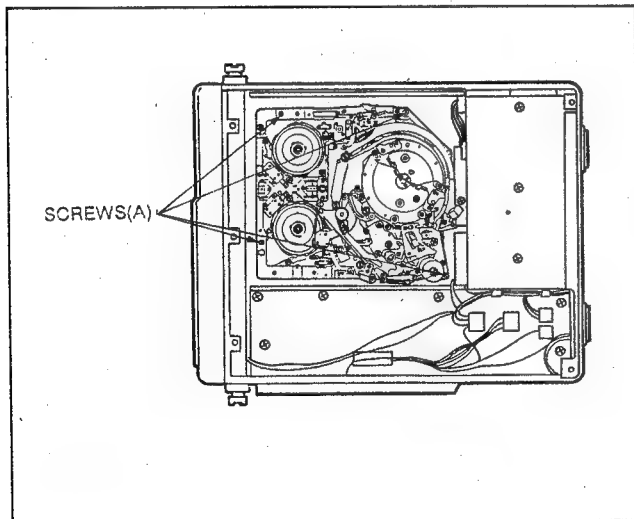
1. Remove the top panel, refer to item 2-3.
2. Remove the connector (A) and connector (B).
3. Unscrew the 4 screws (A) and remove the cassette carriage.



2-5. MECHANICAL CHASSIS UNIT REMOVAL

[Removal]

1. Remove the top panel, refer to item 2-3.
2. Remove the cassette carriage, refer to item 2-4.
3. Disconnect the connector of FE/BIAS OSC P.C.Board.
4. Unscrew the 4 screws (A) and remove the mechanical chassis unit.

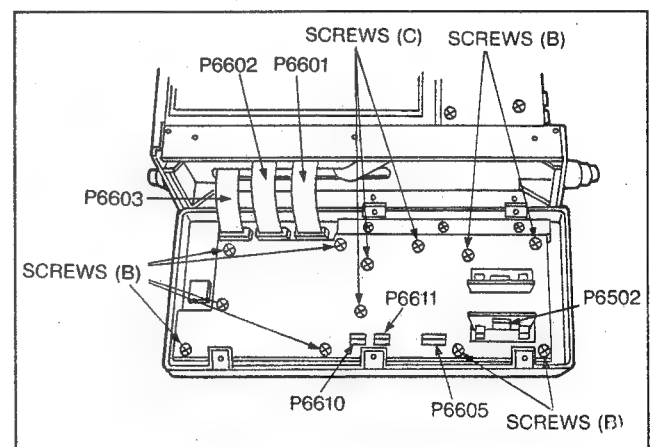
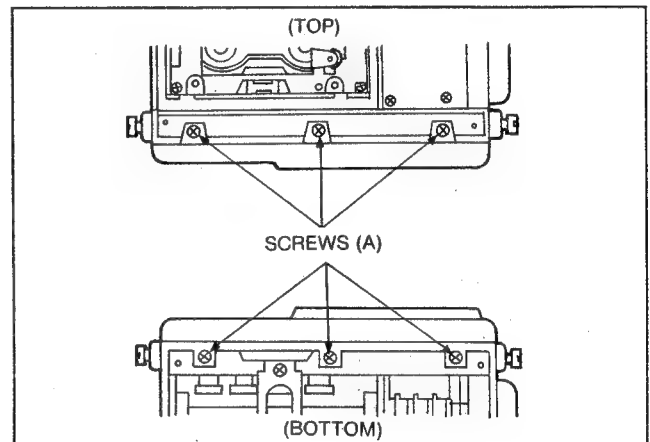


[Installation]

1. Install the mechanical chassis unit following the previous steps in reverse order.
2. Be carefully do not cut the each wires.

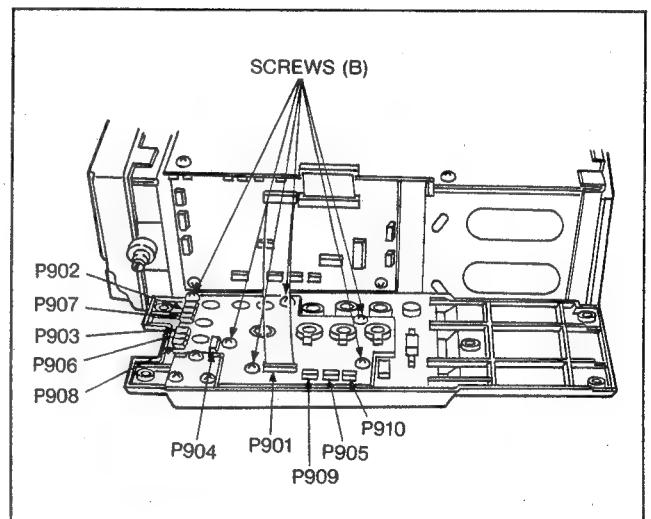
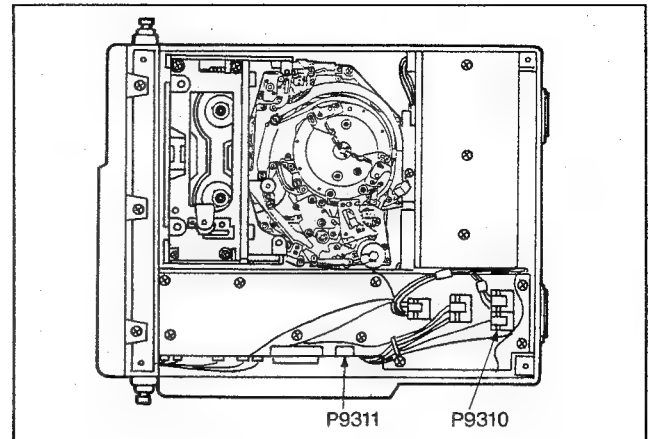
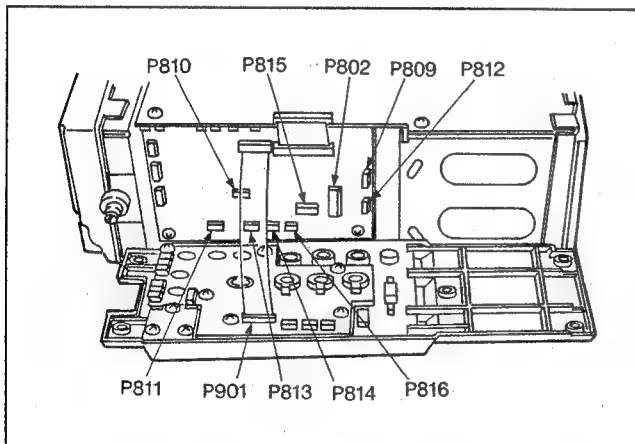
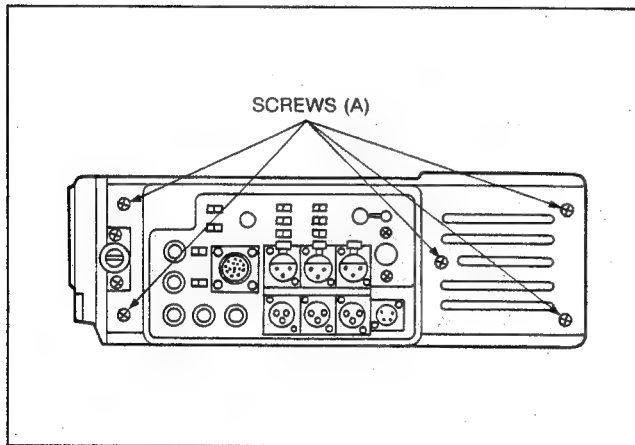
2-6. TC OPERATE P.C.BOARD REMOVAL

1. Remove the top panel, refer to item 2-3.
2. Remove the bottom panel, refer to item 2-1.
3. Unscrew the 6 screws (A) and remove the Front panel as shown in figure.
4. Disconnect the connector P9305 of PB POWER MOTHER P.C.Board.
5. Disconnect the connectors P6601, P6602, P6603, P6605, P6610 and P6611 of TC/OPERATE P.C.Board.
6. Disconnect the connector P6502 of REC VR P.C.Board.
7. Disconnect the connector P6503 of PB VR P.C.Board.
8. Unscrew the 9 screws (B) and the 3 screws (C) and remove the TC/OPERATE P.C.Board.



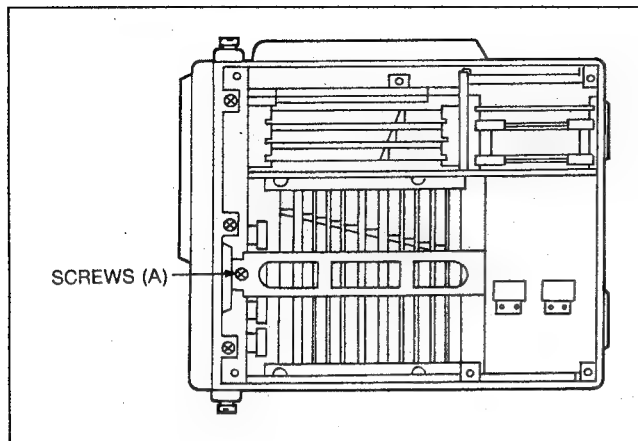
2-7. JACK 1 P.C.BOARD REMOVAL

1. Unscrew the 5 screws (A) as shown in figure.
2. Disconnect the connector P901 of JACK 1 P.C.Board.
3. Disconnect the connectors P802, P809, P810, P811, P812, P813, P814, P815 and P816 of JACK 2 P.C.Board.
4. Disconnect the connectors P9310, P9311 of PB POWER MOTHER P.C.Board.
5. Disconnect the connectors P902, P903, P904, P905, P906, P907, P908, P909 and P910 of JACK 1 P.C.Board.
6. Unscrew the 7 screws(A) and remove the JACK 1 P.C.Board.



2-8. P.C.BOARD REMOVAL

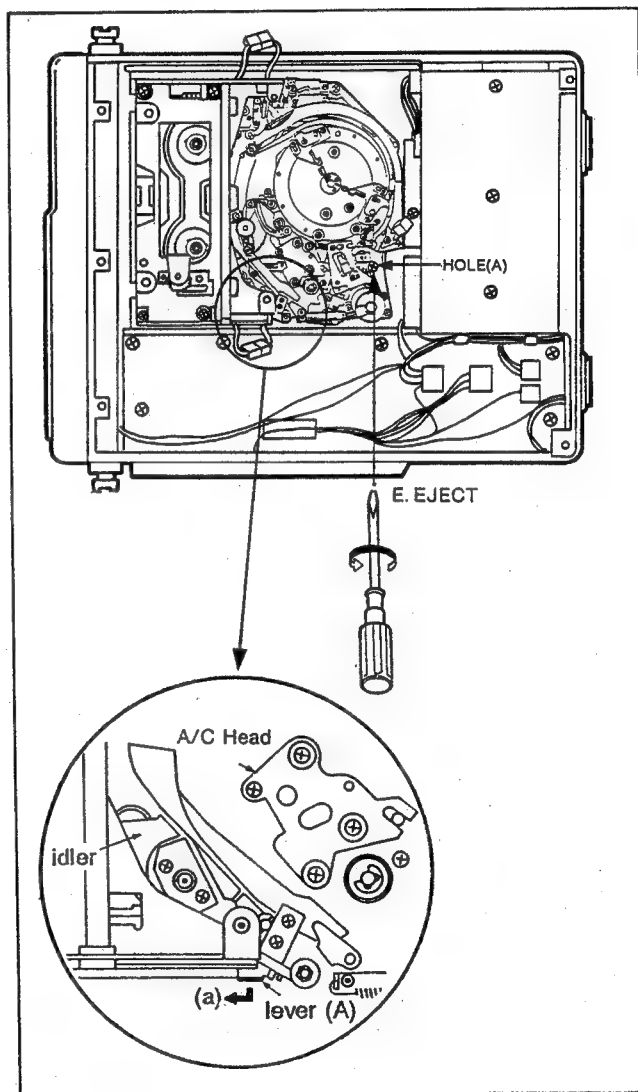
1. Remove the bottom panel, refer to item 2-1.
2. Unscrew the screw (A) and remove the fixing plate.
3. Pull out the P.C.Board



3. MANUAL TAPE EJECT

If a cassette tape will not be ejected due to power failure, carry out method of "MANUAL EJECT" as follows.

1. Remove the cassette cover and top panel, refer to item 2-3.
2. Pull the lever (A) to direction (a) so that the idler is touched to take up reel as shown in figure.
3. Insert a screw driver into the hole (A).
4. Gently rotate the screw driver to counterclockwise until the tape is ejected.
5. After ejecting the tape, the lever (A) should be set to the original position.



4. RECOMMENDED CLEANING AND CONFIRMATION PROCEDURE

Frequent cleaning and maintenance as listed this section, will assure optimum performance and longer life of your . Maintenance parts replacement is described in Maintenance procedure section.

Please refer to the table of contents for your particular application.

1. Required Material
2. Recommended Schedule
3. Head Cleaning
4. Pinch roller, capstan, post guides
5. Brush Assemblies
6. Brakes & Reel table
7. Cleaning Machines table
8. Lubrication

CLEANING MAINTENANCE PROCEDURES

4-1. MATERIALS REQUIRED

1. Head cleaning fluid (lifting solvent)
2. Lint-free head cleaning cloth
3. Canned air
4. Molyton grease (Panasonic part number : MOR265 and VFK0749)
5. Head inspection mirror

4-2. RECOMMENDED SCHEDULE

The following list is a recommended cleaning and checking schedule. The frequency of maintenance depends on the actual use and operating environment and should be modified accordingly.

1. Before Shooting: - Cleaning of Tape path i.e., Upper and Center and Lower Drum, A/C Head, Full Erase Head, Tape Post Guides, Pinch Roller, Capstan.
2. Monthly: - Cleaning of Reel Base, Cassette Assembly.
3. 1000 hours or 3 months
Check the tape tension and brake torque.
4. 2000 hours or 6 months
Lubricate gears and mechanical parts.
5. 4000 hours or 1 year
Clean out machine with canned air.

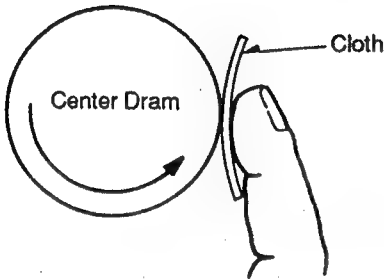
4-3. CLEANING PROCEDURES

Note: All procedures should be performed with AC power OFF.

(1) Video Head Cleaning Method:

Clean heads by applying even pressure and rotating center drum a few turns (as shown).
Never wipe in an up and down motion.

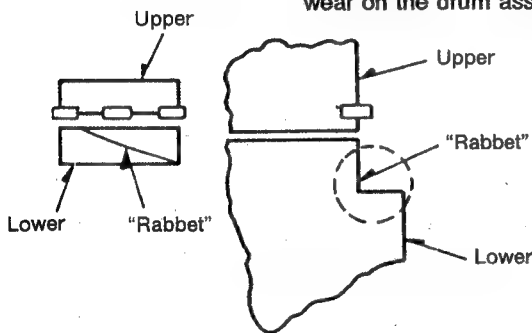
1. Clean with cleaning liquid
2. Wipe dry
Clean heads until the cleaning cloth does not show any signs of dirt.
3. Check that no thread from the cleaning cloth remain on the heads.



TAPE PATH CLEANING METHOD

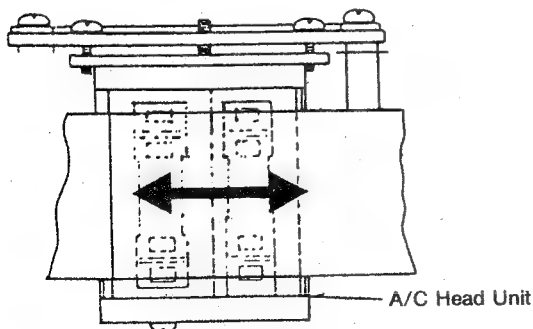
(2) Lower Drum Cleaning Method:

Clean the rabbet guide with a sharpened toothpick. Check that no threads from the cleaning cloth remain on the heads. Use an inspection mirror to check for any scratches or signs of wear on the drum assembly.



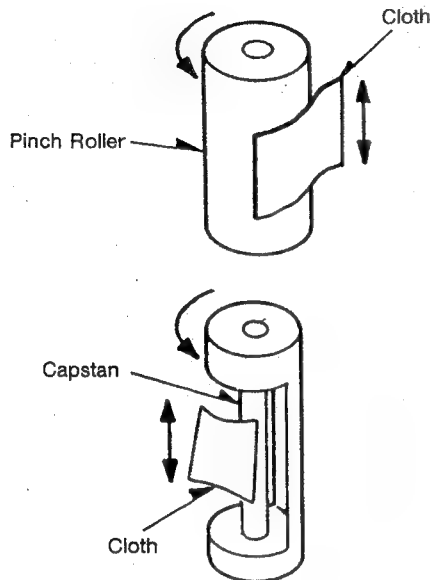
(3) A/C Head Full Erase Head and MR Head Cleaning Method:

Clean the A/C head Full erase head and MR head with cleaning fluid then wipe dry.



(4) Pinch Roller, Capstan Post Roller Cleaning Method:

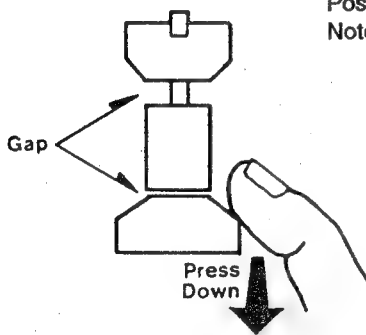
The pinch roller should be cleaned with a lint-free cloth and cleaning fluid. Rotate the roller and clean its entire surface using an up and down motion until the cleaning cloth does not show any signs of dirt. The capstan and post roller should be cleaned in the same manner. In the case of the post roller, only a little cleaning fluid should be used to avoid damaging the ball-bearing.



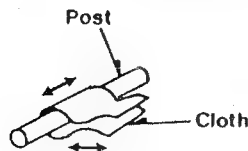
(5) Post Guides Cleaning Method:

Post guides should be pushed down to create a gap at the top of the guide.

Note: Cleaning should ONLY be performed using a dry cloth to prevent damage to the ball-bearing.



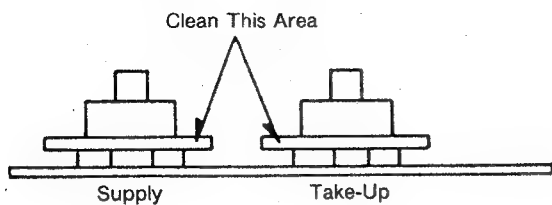
(6) Fixed Post Cleaning Method:



Fixed posts P4, P7 should be cleaned with cleaning fluid in the direction of tape travel. At the same time, check for any wear at the point where the edge of the tape makes contact.

(7) Reel Table Cleaning Method:

The reel table brake contact surface should be rotated and the whole surface cleaned with cleaning fluid and wiped dry.

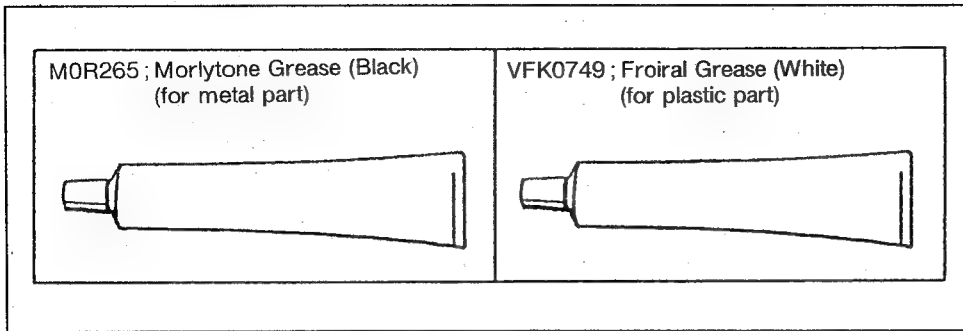


(8) Cleaning of the Machine's Interior:

Remove the cassette-up mechanism and cover the drum assembly to prevent dust from contaminating the video heads, then blown out any dust from the chassis and cassette-up mechanism with an air-gun.

Note: Ensure that dust is blown out of the machine and NOT back inside it.
Cassette-up or cassette carriage

4-4. LUBRICATION OF THE GEARS AND SLIDING SURFACES (Every 2000 Hours or Every 6 Months of Operation)



A. Grease Up Procedures

1. Turns power off.
2. Remove the cassette compartment.
3. Confirm the mechanism is unloading condition.
4. Confirm the grease of main mechanism parts, if any dust are stuck, clean them.
5. Grease the plastic part with Froiral Grease, part number VFK0749 (Panasonic order number), and metal part with Motion Grease M0R265. The parts positions are described following step B.
6. Set the mechanism to loading completion condition.
Install the screw driver to manual eject gear and rotate the screw driver to clockwise until loading completion condition.
7. Repeat item 4 and 5.
8. Set the mechanism unloading completion by reverse way of item 6.

B. Mechanism Parts

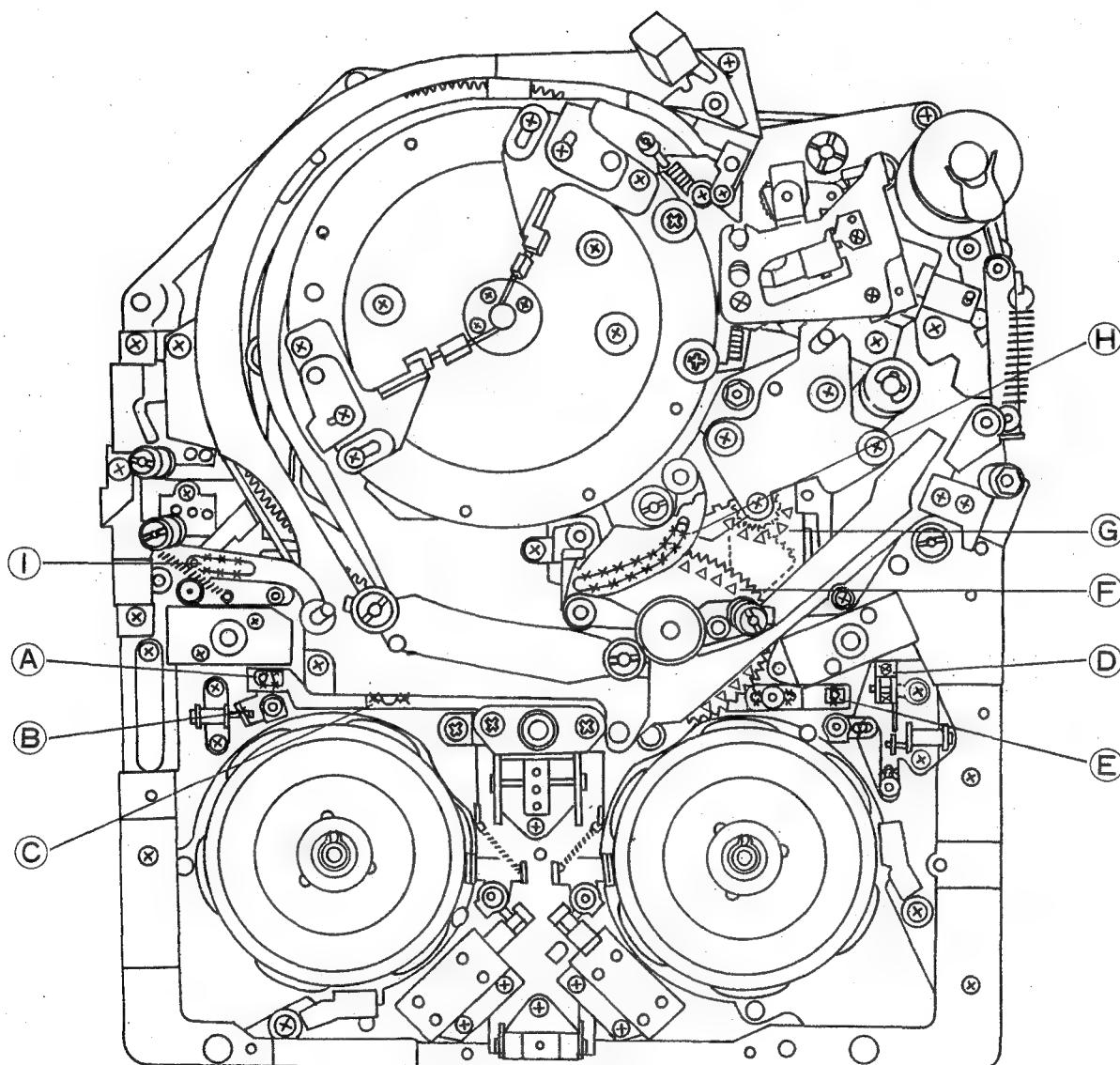
Grease up the following parts if they are dried.

- (1) xxxxx part : Motion Grease M0R265.
- (2) ▲▲▲▲▲ part : Froiral Grease VFK0749 (or Froiral G-31SB)

B. Mechanism Parts

Grease up the following parts if they are dried.

- (1) xxxxx part : Motion Grease MOR265.
- (2) ▲▲▲▲ part : Froiral Grease VFK0749 (or Froiral G-31SB)



5. MAIN MECHANISM ADJUSTMENT PROCEDURES

5-1. TAPE TRANSPORTATION POSTS NAME

There are 10 posts Roller with bearing P1, P3, P5, P6, P8, P9 and P10, 3 posts with out bearing and A/C Head.

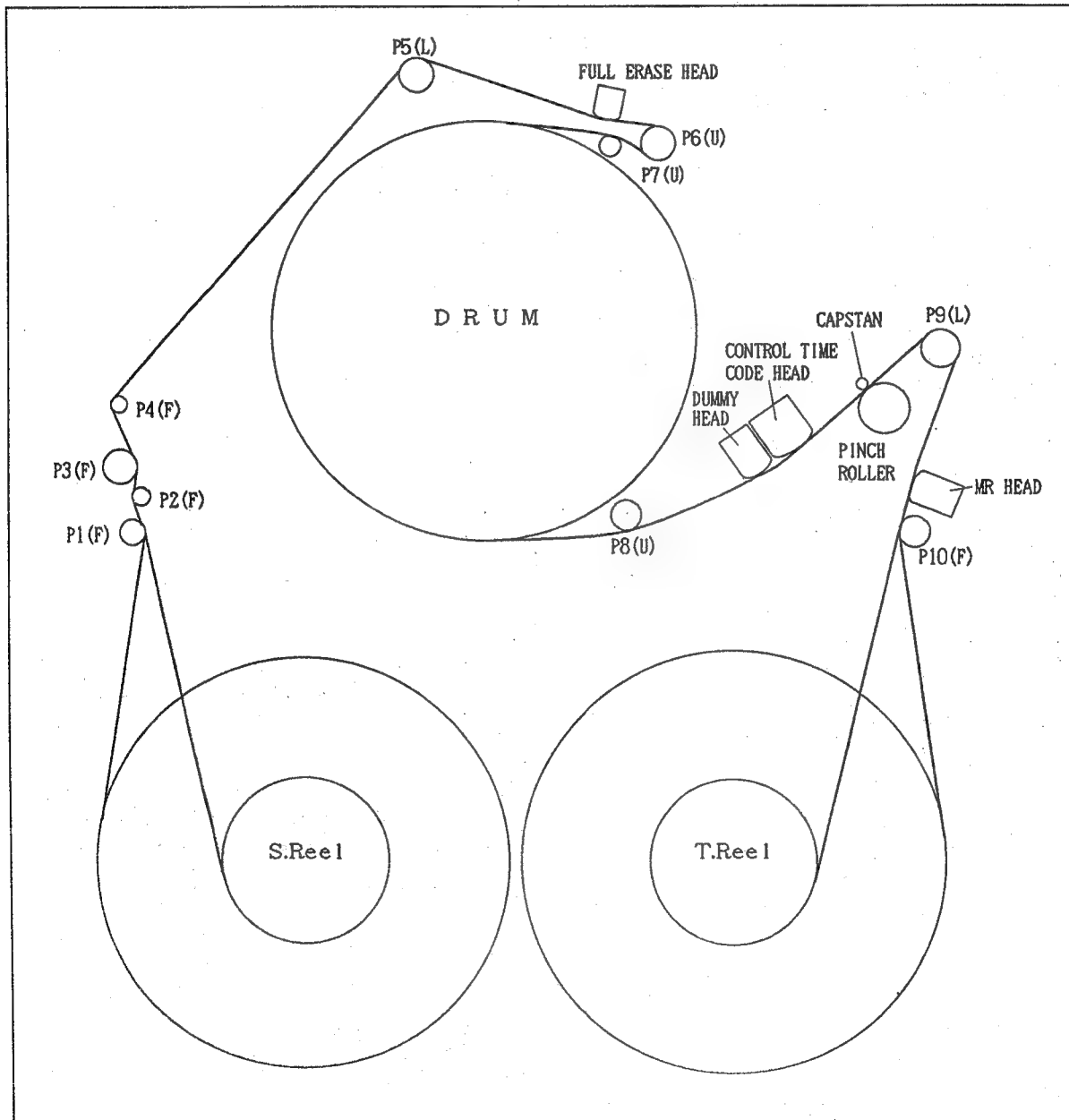
P1, P3, P5 through P10 posts need height adjustment.

P4 post needs tension adjustment and sensor gain adjustment.

A/C head needs tilt adjustment, height adjustment, azimuth adjustment and X value adjustment.

The tilt angle of the A/C head influences the exit portion of RF envelope linearity adjustment.

MR head needs height adjustment for detecting head clog of CTL and Time Code.



5-2. TENTELO METER CALIBRATION

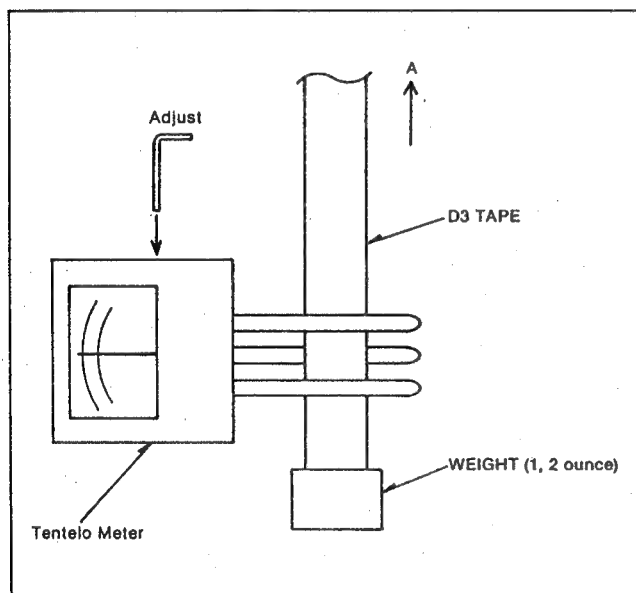
Specification : 1 ounce
 2 ounce scale compensation Mode
 : D3 Tape Pull up
 Tape speed 83.880mm/sec

<STEP 1>

1. Connect the one ounce calibration weight to the D3 tape (about 30cm).
2. Set the above tape with the Tentelo meter as shown below.
3. Pull up the tape as same as tape transportation speed, 83.880mm/sec.
4. Adjust the Tentelo meter so that the meter shows just one ounce.

<STEP 2>

1. Connect the Two ounce calibration weight to the D3 tape (about 30cm).
2. Set the above tape with the Tentelo meter as shown below.
3. Pull up the tape as same as tape transportation speed, 83.880mm/sec.
4. Compensates the reading value according with compensation table.



5-3. T-S OFF SET VOLTAGE ADJUSTMENT

Board	Servo 1
T.P.	TP2005
Adj.	VR2001
MODE	Eject
SIG.	-----
M.EQ.	D.V.M.
Spec.	2400mV (± 10 mV)

5-4. T-S GAIN ADJUSTMENT

Board	Servo 1
T.P.	TP2005
Adj.	VR2003
MODE	REC PAUSE using a cassette shell only (No tape) *1 *2
SIG.	-----
M.EQ.	D.V.M.
Spec.	1800mV (± 100 mV)

*1 Make a tape removed cassette shell, and used for this adjustment.

*2 Place the unit in the REC Pause mode and after that press the stop button immediately.

<STEP 1>

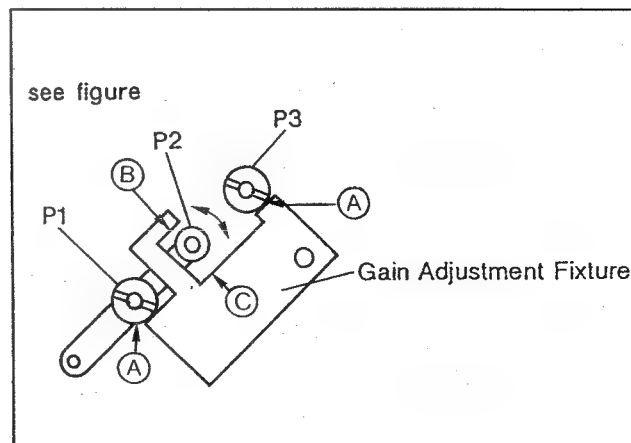
Scope CH1 : TP2005 1V/D 10us/D

<STEP 2>

Set the gain adjustment fixture as shown figure. It should be touch the roller portion of P1 and P3 post. (A portion)

<STEP 3>

Adjust VR2003 so that the measurement range is 1800mV \pm 100mV when P2 post is moved between left (B) and right (C) side of the fixture by hand.

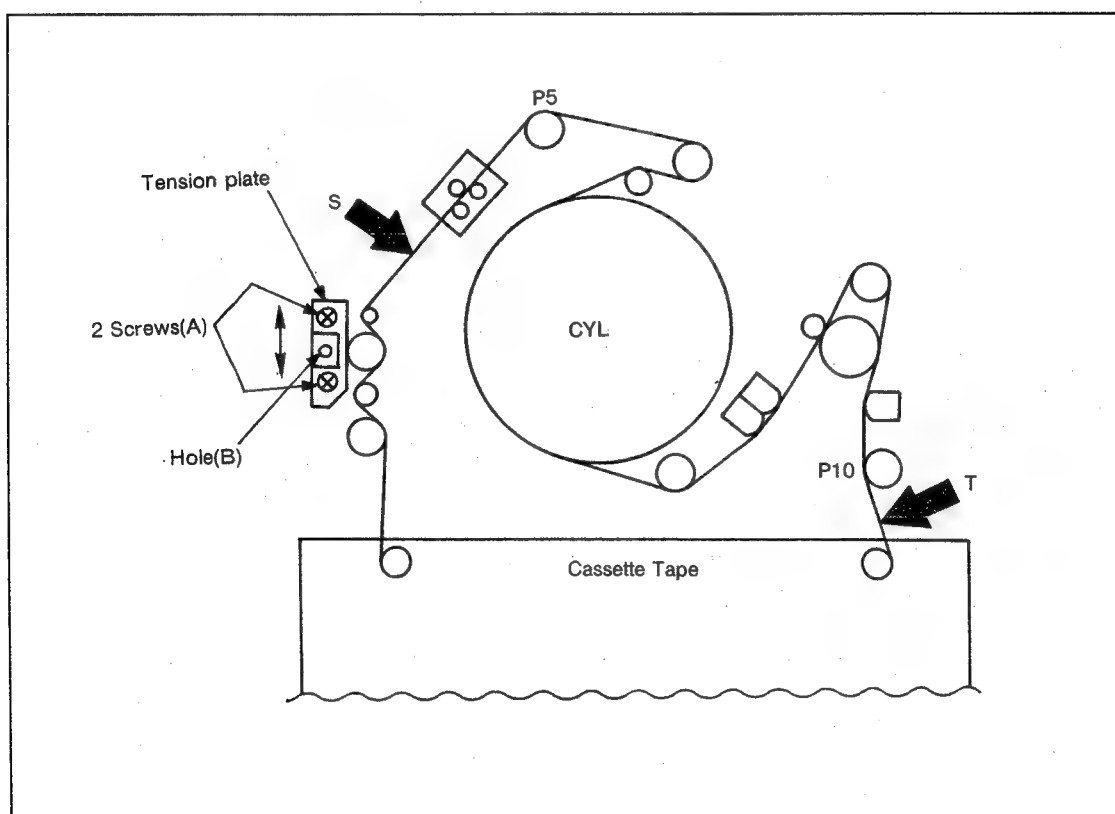


5-5. TENSION ADJUSTMENT

1. Insert a blank tape and place the unit in the recording mode.
2. Set the calibrated tentelo meter between P4 and P5 post as shown in figure.
3. Confirm the tension is within specification, if it is not adjust following.
4. Loosen the 2 screws (A) and insert the eccentric driver to the hole (B).
5. Adjust the tension is within specification and tighten the 2 screws (A). And confirm the tension at each mode.

NOTE: This adjustment range is 6gms if the tension measure is out of range replace the spring.

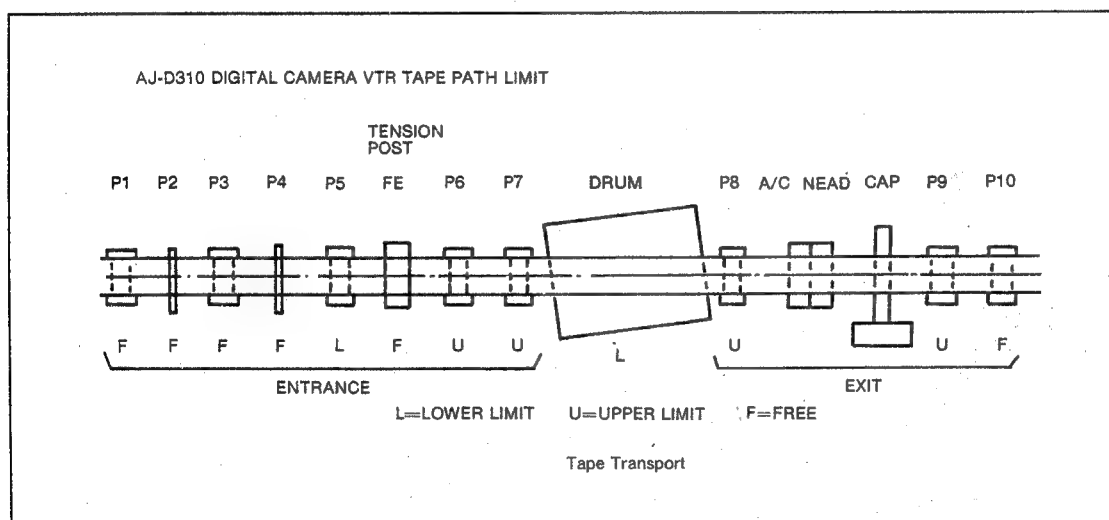
	REC PLAY	REVX5	FF	REW
S	22 ± 2	20 ± 5	10 ± 5	25 ± 10



5-6. TAPE TRANSPORT POSTS LIMIT POSITION TABLE

NAME	LIMIT	ADJUSTMENT
P1 Post	Free	Set Free Position
P2 Post	-----	
P3 Post	Free	Set Free Position
P4 Post	-----	
P5 Post	Lower Limit	Upper Limit during PLAY mode
P6 Post	Upper Limit	Confirm the Entrance side Envelope is flat
P7 Post	Upper Limit	Upper Limit during PLAY mode
P8 Post	Upper Limit	Confirm the EXIT side Envelope is flat
P9 Post	Upper Limit	Upper Limit during PLAY mode
P10 Post	Free	Set Free position

AJ-D320 DIGITAL PORTABLE VTR

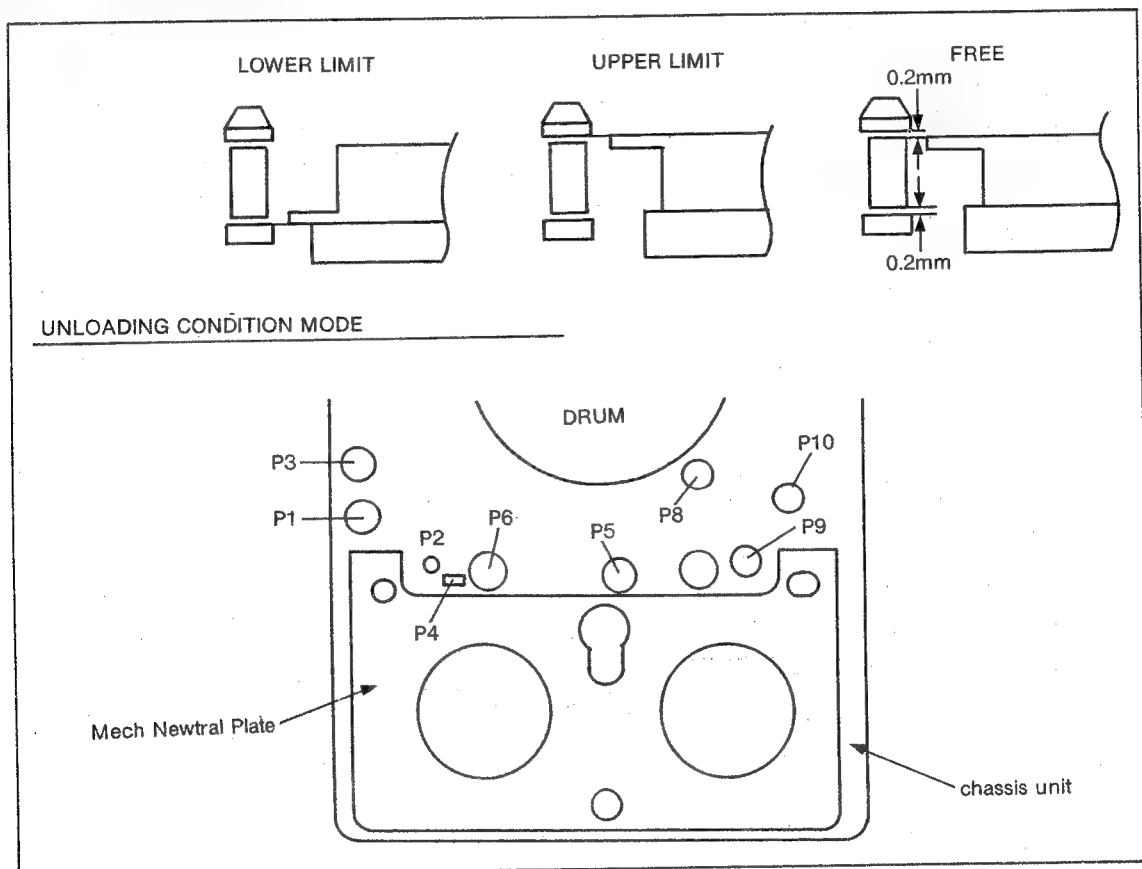


5-7. POST HEIGHT PRE-ADJUSTMENT (FACTORY ADJUSTMENT)

Basically, Post Roller is positioned to original height after replacing (as long as, the hex screw is not misadjusted). However, in order to avoid the tape damage in Loading and Unloading mode, confirm that the height of the P1, P3, P5, P8, P9 and P10 posts are set to specified height, using MECH. Plate and height fixture.

In order to do this, remove the cassette compartment, and install the mechanical neutral adjustment plate over the reel tables. Then place the post height fixture on the Mechanical Neutral Adjustment Plate as shown in figure. (thumbscrews of neutral plate can be removed as needed). The upper and lower flanges of the P1, P3, P5, and P10 post should touch the upper and lower surface of fixture as shown in figure. If these posts do not touch the surface, adjust the post height as needed.

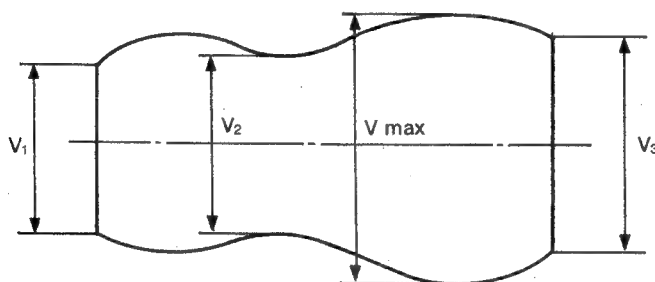
UNLOADING CONDITION MODE



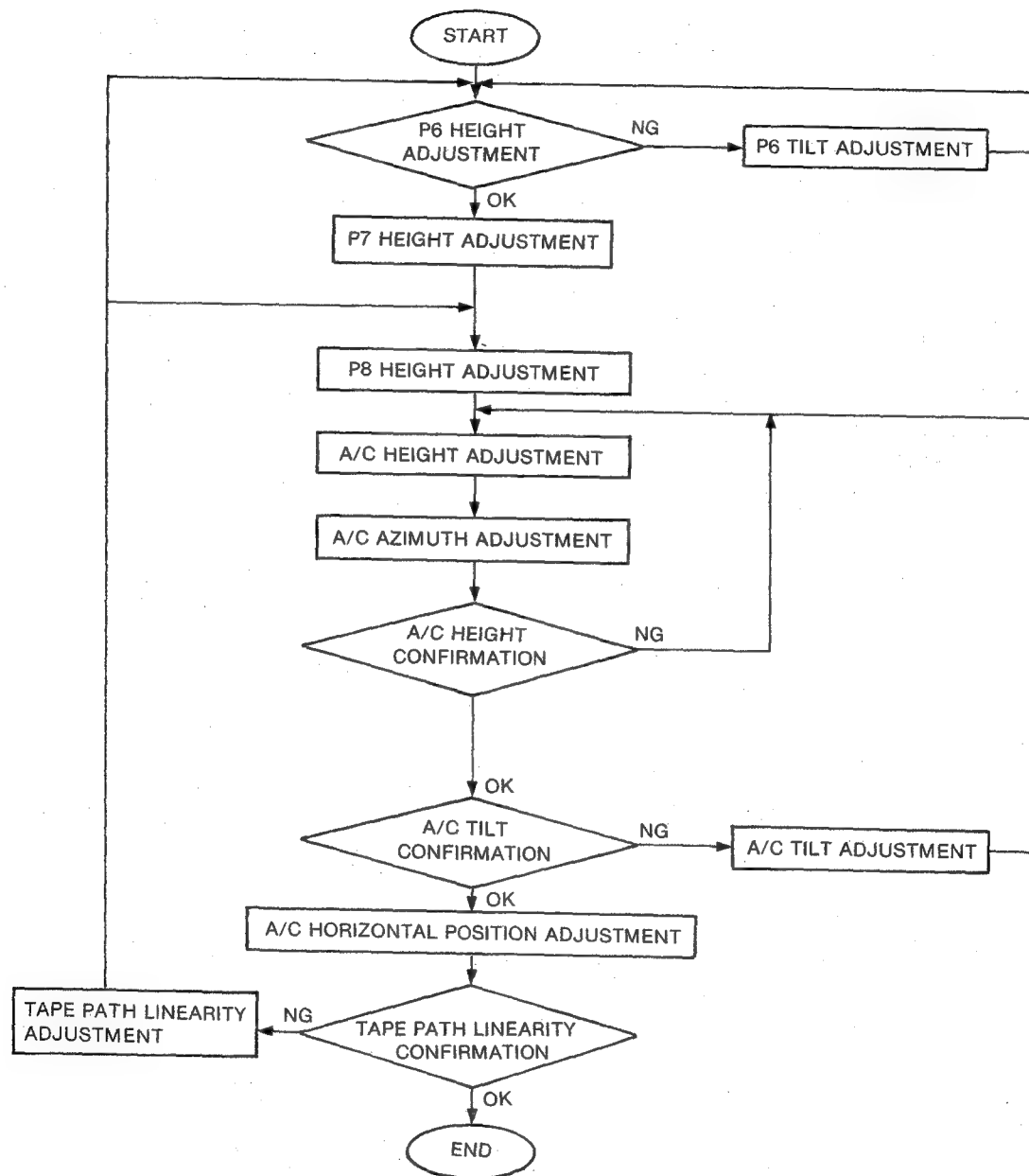
SPECIFICATION	POST	LIMIT
	P8,P9	UPPER
	P1,P3,P10	FREE
	P5	LOWER

5-8. RF ENVELOPE LINEARITY SPECIFICATION

TEST	TP6, TP7 (P/S BUFF BOARD), TP12 (H.SW)(SERVO BOARD)	
SPEC	LINEAR MASTER PLAY	$V1/V_{max}, V2/V_{mas}, V3/V_{mas} \geq 0.92$
	SELF RECORDING PLAYBACK	$V1/V_{max}, V3/V_{max} \geq 0.9, V2/V_{max} \geq 0.95$
	SELF RECORDING PLAYBACK	Waving of Envelope is less than 5% at maximum envelope portion.
MODE	LINEAR MASTER PLAYBACK	
	SELF RECORDING PLAYBACK (COLOR BAR or MONOSCOPE)	
	ADJUST TRACKING VR and SET ENVELOPE IS MAXIMUM	
TOOL	1. POST DRIVER 2. HEX. WRENCH M2.6	



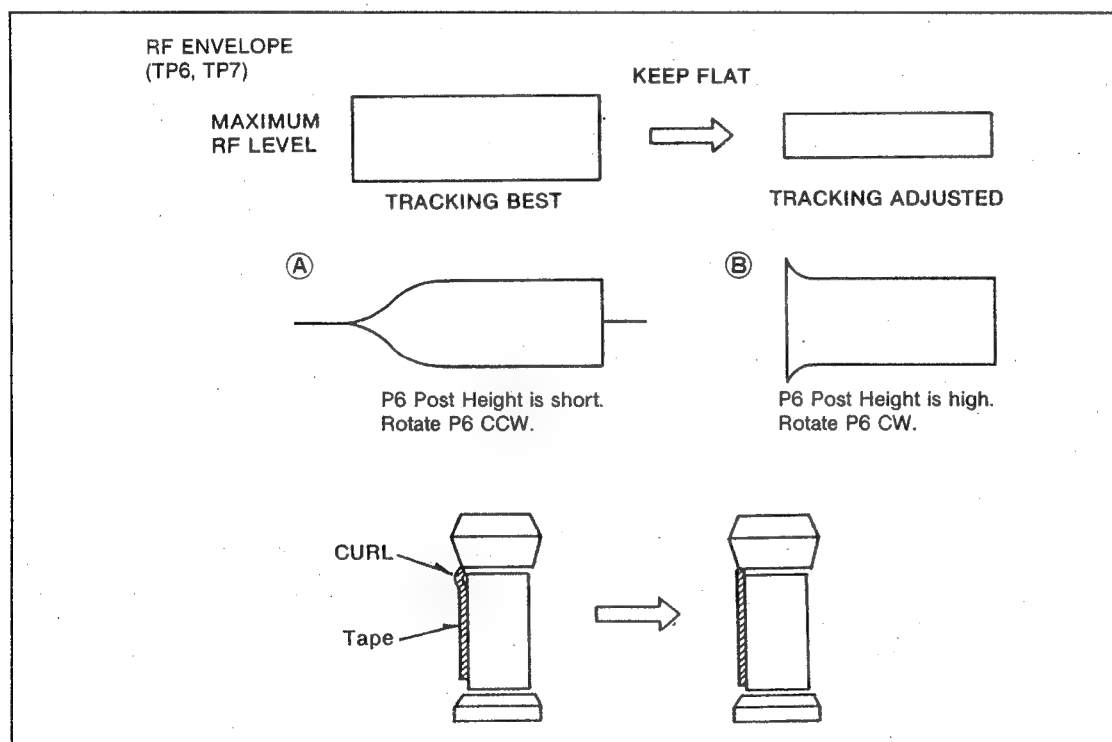
5-9. ENVELOPE LINEARITY ADJUSTMENT FLOWCHART



5-10. P6 POST HEIGHT ADJUSTMENT

TEST	TP7, TP6 (P/S BUFF BOARD), TP12 (H. SW)(SERVO BOARD)
MODE	LINEAR MASTER TAPE, PLAY mode (confirmation), STOP mode (adjustment)
SPEC	RF ENVELOPE Keeps flat when the tracking is adjusted
TOOL	POST DRIVER

1. If out of specification, place the unit in the STOP mode for protecting of tape damage.
2. Set the P7 post to no limit (Free).
3. Adjust P6 post as shown in figure.
4. Confirm that the RF envelope keep flat when tracking is adjusted in PLAY mode.
5. After that set the P7 post to original limit.
6. Confirm that the P6 and P7 post are not curing on the edge of top and lower flange. If curling appears, readjust the post height.



<Note>

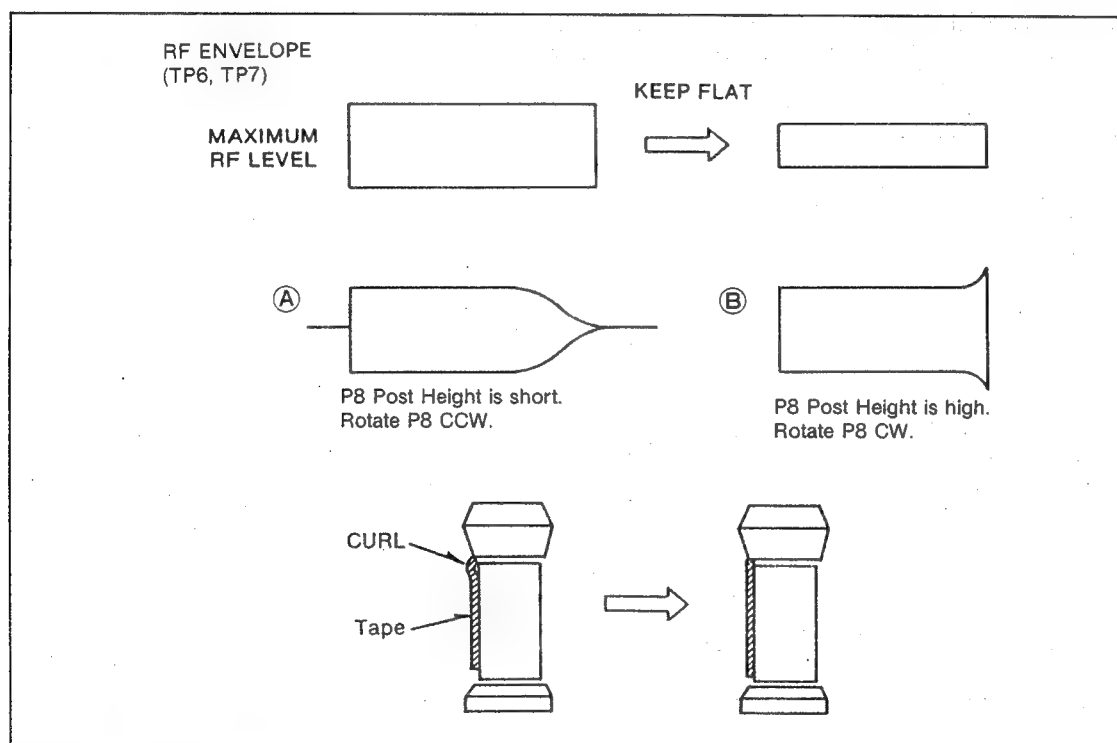
Tracking Adjustment

- 1) Place the unit in the stop or eject mode.
- 2) Set the SET/OFF/DIAG sw to SET position.
- 3) Press HOLD and MENU button together more than 2 seconds.
(Service set menu is displayed on the View Finder.)
- 4) Select the "1. SERVO" by using the SHIFT button.
- 5) Press the START button.
(SERVO menu is displayed on the View Finder.)
- 6) Select the "2. TRACKING" by using the SHIFT button.
- 7) Place the unit in the PLAY mode.
- 8) Press the FF/REW button for tracking adjustment.
(Tracking center is "40". The tracking data change to "40" automatically when set the SET/OFF/DIAG sw to OFF position.)

5-11. P8 POST HEIGHT ADJUSTMENT

TEST	TP7, TP6 (P/S BUFF BOARD) TP12 (H. SW)(SERVO BOARD)
MODE	LINEAR MASTER TAPE, PLAY mode (confirmation), STOP mode (adjustment)
SPEC	RF ENVELOPE Keeps flat when the tracking is adjusted
TOOL	POST DRIVER

1. If out of specification, place the unit in STOP mode for protecting of tape damage.
2. Set the P7 post to no limit (Free).
3. Adjust P8 post as shown in figure.
4. Confirm that the RF envelope keep flat when tracking is adjusted in PLAY mode.
5. After that set the P7 post to original limit.
6. Confirm that the P8 and P7 post are not curling on the edge of top and lower flange. If curling appears, readjust the post height.



<Note>

Tracking Adjustment

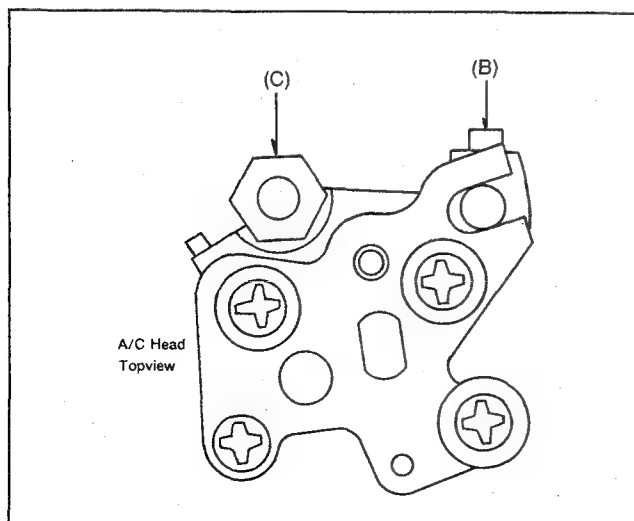
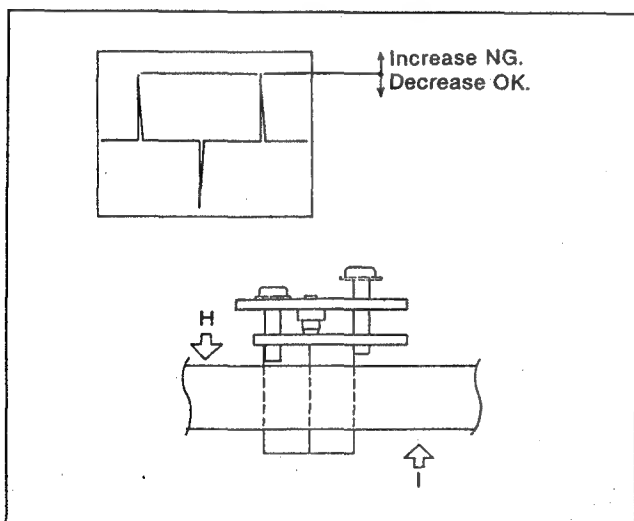
- 1) Place the unit in the stop or eject mode.
- 2) Set the SET/OFF/DIAG sw to SET position.
- 3) Press HOLD and MENU button together more than 2 seconds.
- 4) Select the "1. SERVO" by using the SHIFT button.
- 5) Press the START button.
- 6) Select the "2. TRACKING" by using the SHIFT button.
- 7) Place the unit in the PLAY mode.
- 8) Press the FF/REW button for tracking adjustment.
(Tracking center is "40". The tracking data change to "40" automatically when set the SET/OFF/DIAG sw to OFF position.)

5-12. A/C HEAD HEIGHT ADJUSTMENT

SPEC	CTL Output Level is maximum
MODE	Linear Master Tape playback
TEST	TP2 on SERVO Board
CONFIRM	Press tape H and I direction and confirm the audio level is decreased
TOOL	HEX Wrench M3, NUT DRIVER M4
M.EQ	Oscilloscope

<STEP 1>

1. Connect scope CH1 : TP2 on SERVO Board
CH2 : Cue Audio Output
2. Loosen screw "B" slightly.
3. Press tape gently "H" and "I" direction.
4. If the CH1 (CTL) level increase "H" direction, rotate screw "C" counterclockwise.
5. If the CH1 (CTL) level increase "I" direction, rotate screw "C" clockwise.
6. Tighten screw "B".

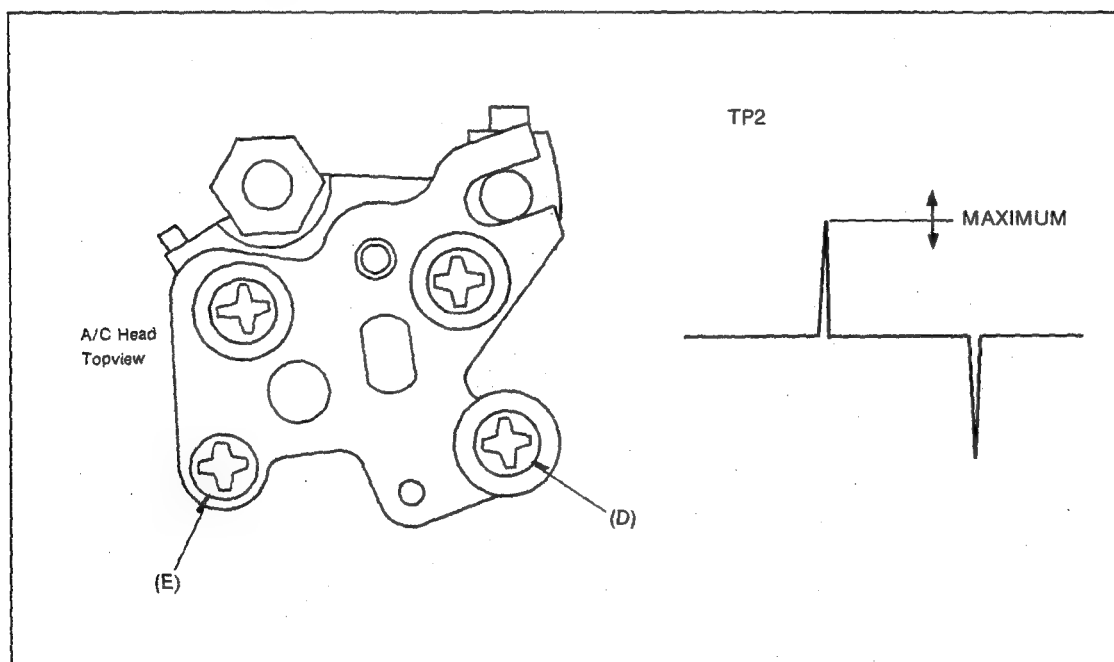


5-13. A/C HEAD AZIMUTH ADJUSTMENT

SPEC	CTL Output Level is maximum
MODE	Linear Master Tape Playback
TEST	TP2 on SERVO Board (CTL)
ADJUST	SCREW "D", SCREW "E"

<STEP 1>

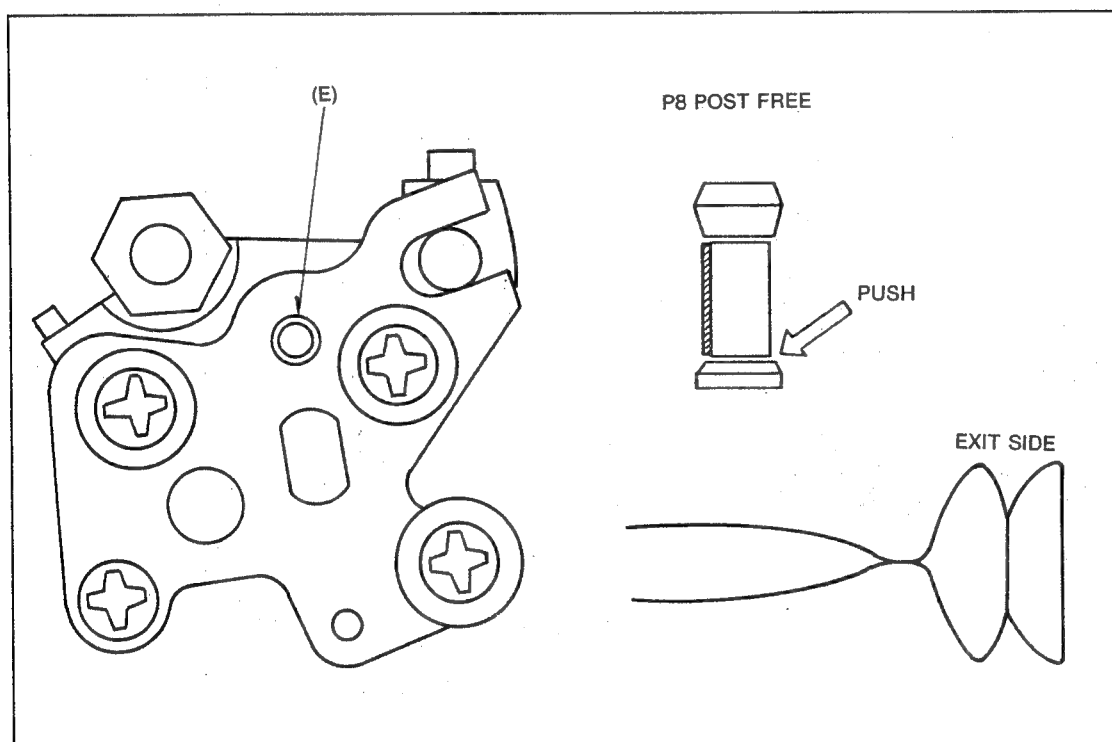
1. Connect scope to TP2 on the Servo Board.
2. Loosen Screw "E" about 1/4 turn CCW.
3. Playback the Linear Master tape.
4. Adjust the screw "D" so that the CTL output level is maximum.
5. Tighten Screw "E".



5-14. A/C HEAD TILT ADJUSTMENT

SPEC	Envelope output level is flat
MODE	Linear master tape playback
TEST	TP6, TP7 (P/S BUFF) Board
ADJUST	Hex Screw

1. SCOPE CH1 : TP6
SCOPE CH2 : TP7
2. Set the P8 post to no limit (Free).
3. Push the lower flange of P8 post and confirm that the envelope output level is as shown in figure.
4. If it is not, adjust screw (E) so that the envelope output is as shown in figure.
5. After that set the P8 post to original limit.



5-15. A/C HEAD HORIZONTAL POSITION ADJUSTMENT

SPEC	RF Envelope, CTL relationship is shown in Fig. 1
	$V/V_{max} \geq 0.95$ (Fig. 2)
TAPE	A/C Head Horizontal Position Master Tape
	Linear Master tape
MODE	PLAY mode, Tracking VR Fix
TEST	Rec Head PB P.C.Board (VFK0854) TP0 (+) (RF)
	S5 SERVO TP1 (CTL)
ADJ.	A/C Head Screw "F" and "E", Hole "G"
TOOL	Eccentric Driver ($\phi 2$) VFK0358

FR OUT
TP0 +

CTL Pulse
TP1

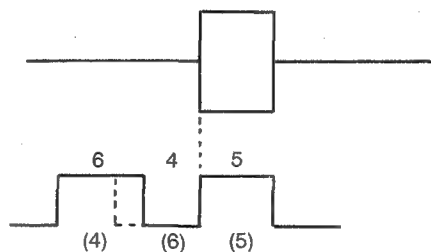


Fig.1

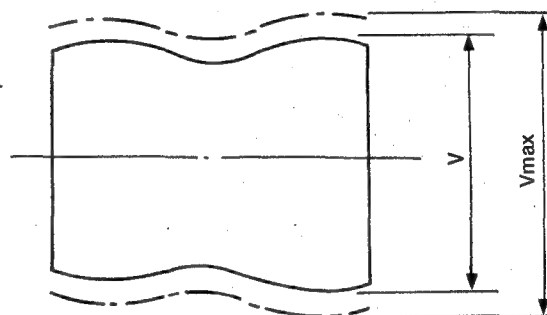
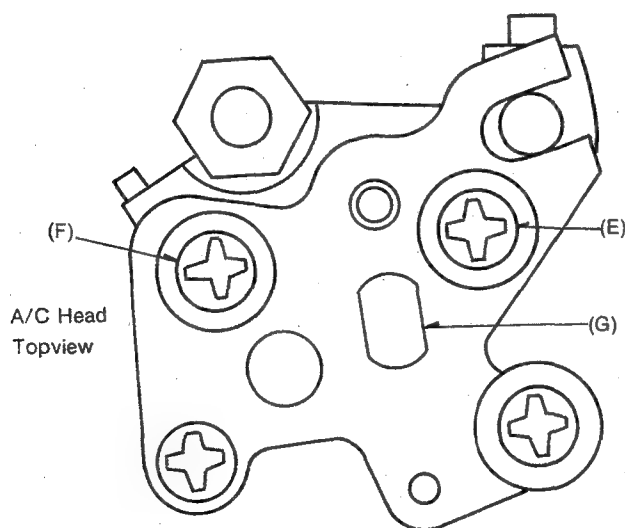


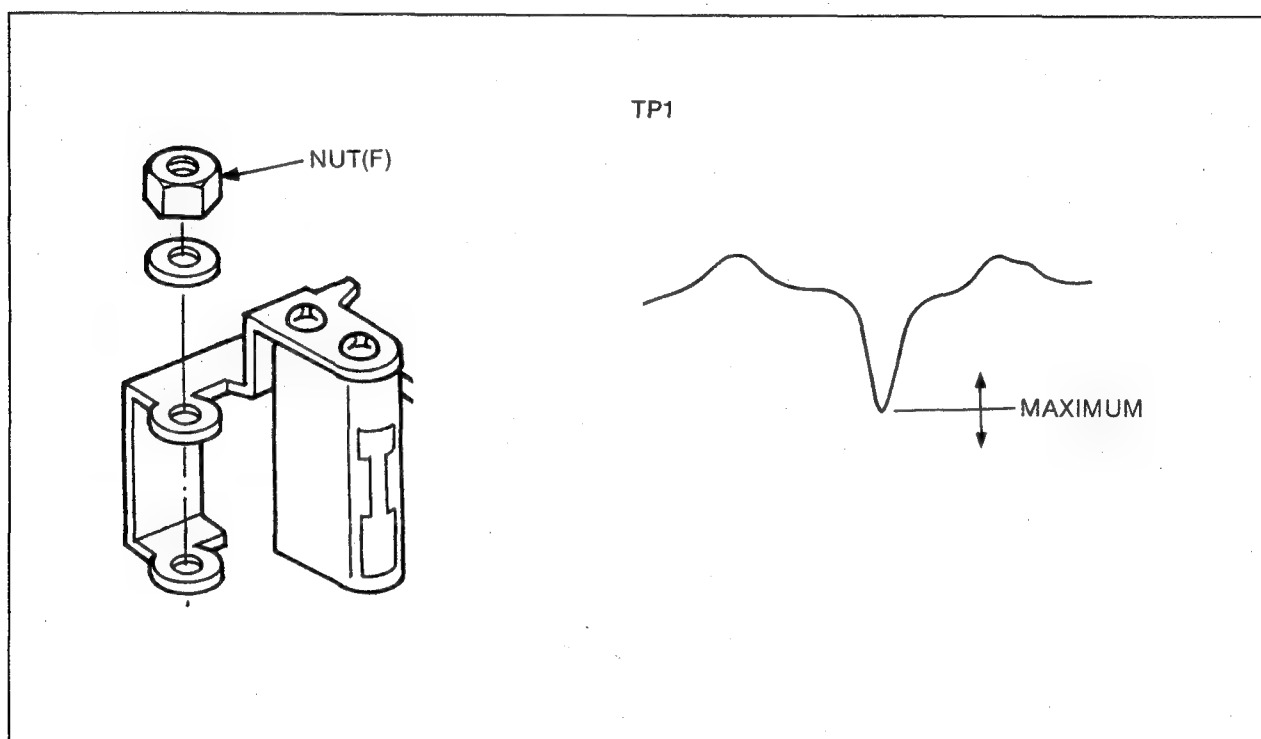
Fig.2



5-16. MR CTL HEIGHT ADJUSTMENT

SPEC	MR CTL output level is maximum
MODE	Linear master tape playback
TEST	TP1 on Servo 2 Board
ADJUST	NUT driver

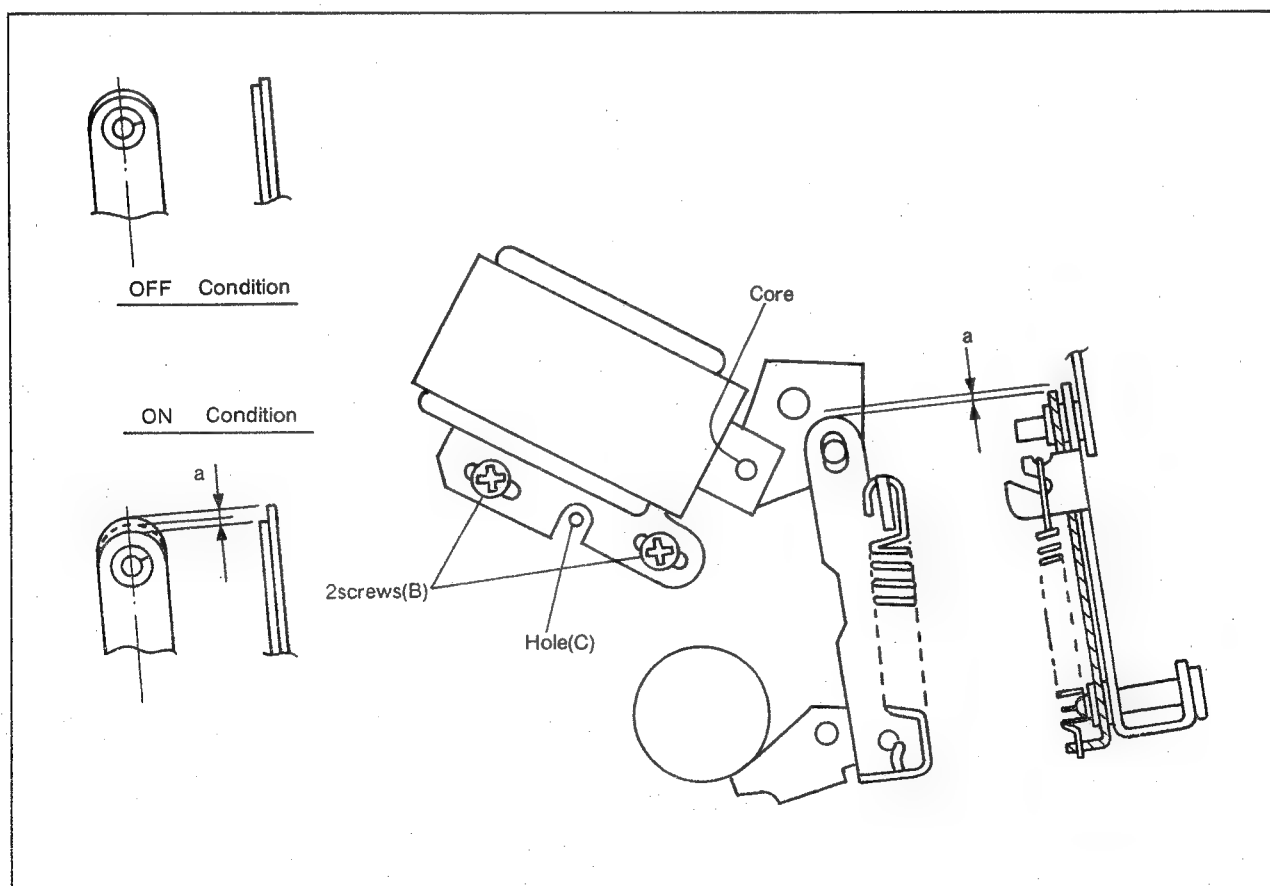
1. SCOPE CH1 : TP1
2. Adjust Nut screw (F) so that the MR CTL output level is maximum.



5-17. PINCH SOLENOID POSITION ADJUSTMENT

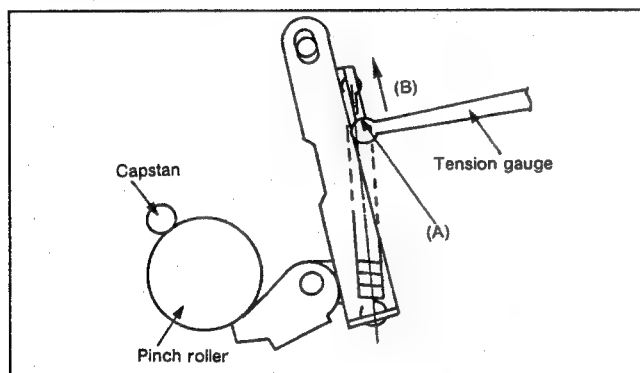
SPEC	A=0.1mm ~ 0.3mm
MODE	Loading Completion mode
TOOL	Eccentric Screwdriver

1. Turn the power switch ON.
2. Blind the supply and take-up phototransistors with black tape, place the unit in the STOP mode.
3. Press the core by hand and confirm that the clearance (A) is 0.1mm ~ 0.3mm as shown figure.
4. If out of specification, loosen the 2 screws (B) and insert the eccentric screwdriver into hole (C).
5. Adjust the pinch solenoid position with the eccentric screwdriver so that the clearance (A) is 0.1mm ~ 0.3mm.
6. After this adjustment, reconfirm the pinch solenoid pressure.



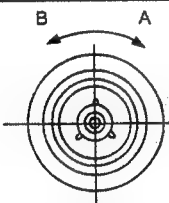
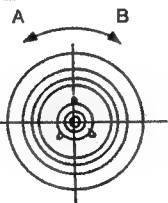
5-18. PINCH SOLENOID PRESSURE CONFIRMATION

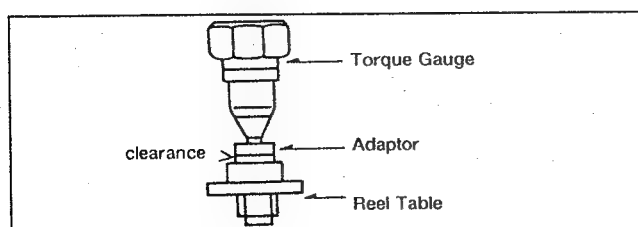
1. Insert a work cassette and place the unit in the PLAY mode.
2. Insert a fan type tension gauge into pinch lever (position A) and press it to "B" direction.
3. Confirm that the tension gauge indicate the specification $1500g \pm 200g$ when the pinch roller stopped.
4. If it is out of specification, reconfirm the pinch solenoid position.



5-19. CONFIRMATION OF BRAKE TORQUE

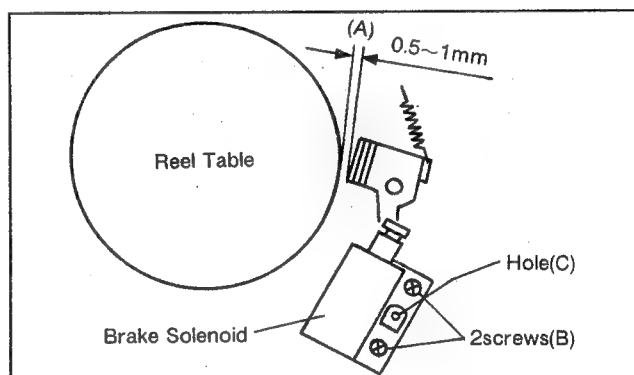
1. Remove the service cover and cassette cover.
2. Remove the cassette compartment.
3. Attach the dial torque gauge adaptor to the dial torque gauge.
4. Lift the gauge (with adaptor) lightly from the table and turn the dial torque gauge in the direction as shown in figure and check that the value when brake slip page begins is within specification.

	 <p>Supply Reel</p>	 <p>Take-up Reel</p>
	A	B
Take-up	250~600g-cm	95~140g-cm
Supply		



5-20. BRAKE SOLENOID POSITION ADJUSTMENT (Supply and Take up)

1. Remove the service cover and cassette cover.
2. Remove the cassette compartment.
3. Press the core by hand and confirm that the clearance (A) is 0.5mm ~ 1.0mm as shown in figure.
4. If out of specification, loosen the 2 screws (B) and insert the eccentric screwdriver into hole (C).
5. Adjust the brake solenoid position with eccentric screwdriver so that the clearance (A) is 0.5mm ~ 1.0mm.



6. MAJOR MECHANISM PARTS REPLACEMENT AND ADJUSTMENT PROCEDURES

6-1. GENERAL

When mechanical parts are replaced, pay attention to the following notes:

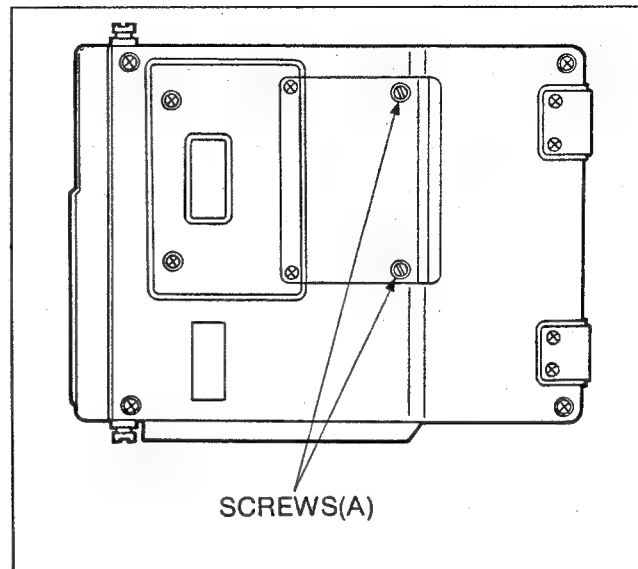
- (1) Always turn the power off before replacing any parts.
- (2) If any adjustment is necessary after the part is replaced, perform the adjustment after replacement.
- (3) Use proper hand tools or fixtures.
- (4) Be sure to clean the parts after replacement.

Also when the mechanical parts are replaced, follow the replacement procedures.

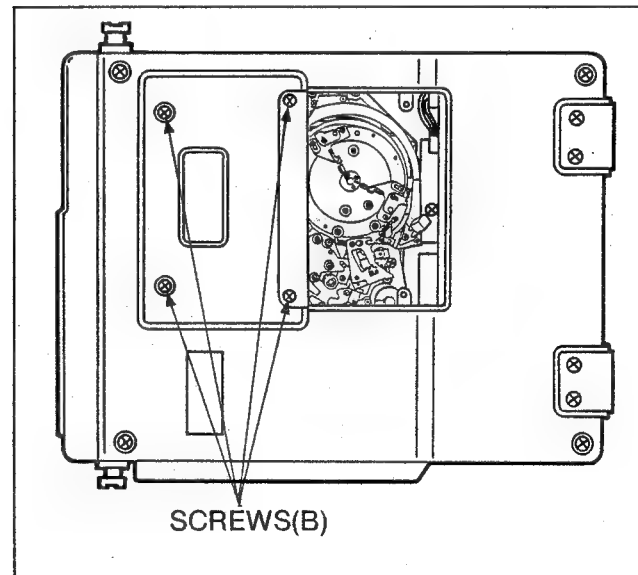
6-2. DRUM UNIT REPLACEMENT

[Removal]

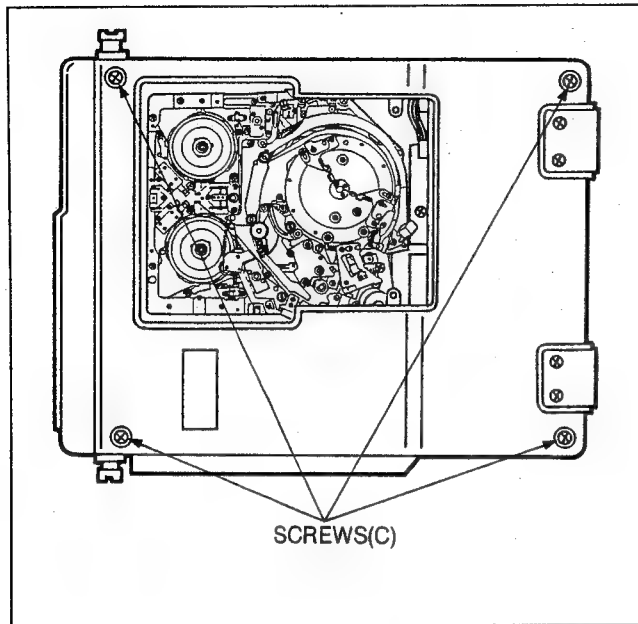
1. Unscrew the screw (A) and remove the service cover as shown in figure.



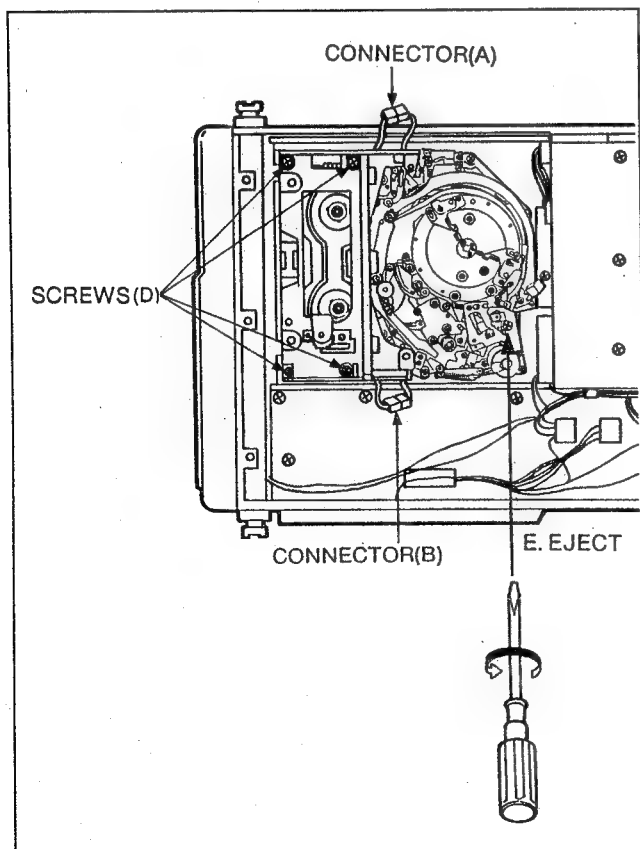
2. Unscrew the 4 screws (B) and remove the cassette cover as shown in figure.



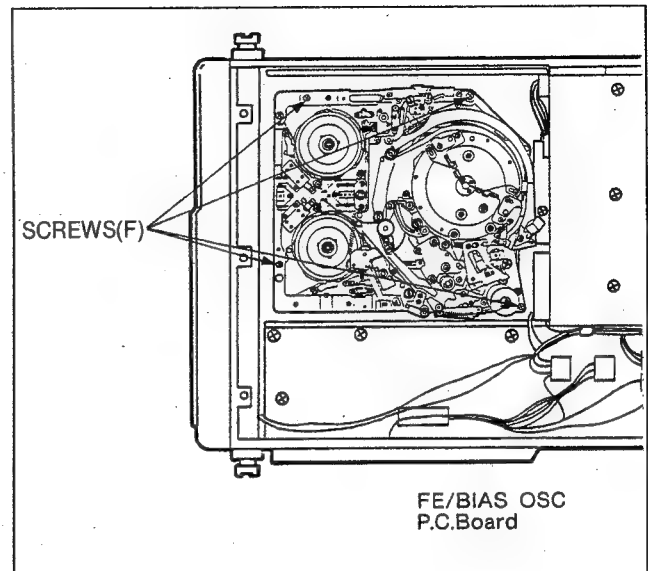
3. Unscrew the 4 screws (C) and remove the top panel as shown in figure.



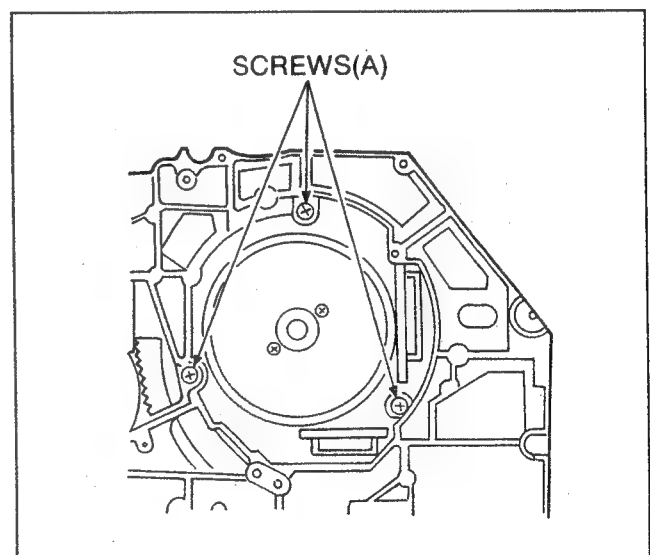
4. Place the unit in the Eject mode by using the MANUAL Eject gear as shown in figure.
5. Unscrew the 4 screws (D) and remove the connector (A) and (B) and remove the cassette up unit as shown in figure.



6. Remove the FE/Bias OSC P.C.Board and disconnect the 3 connectors on the FE/Bias OSC P.C.Board as shown in figure.
7. Unscrew the 4 screws (F) and remove the Mechanism unit as shown in figure.



8. Unscrew the 3 screws (A) and remove the Drum unit as shown in figure.

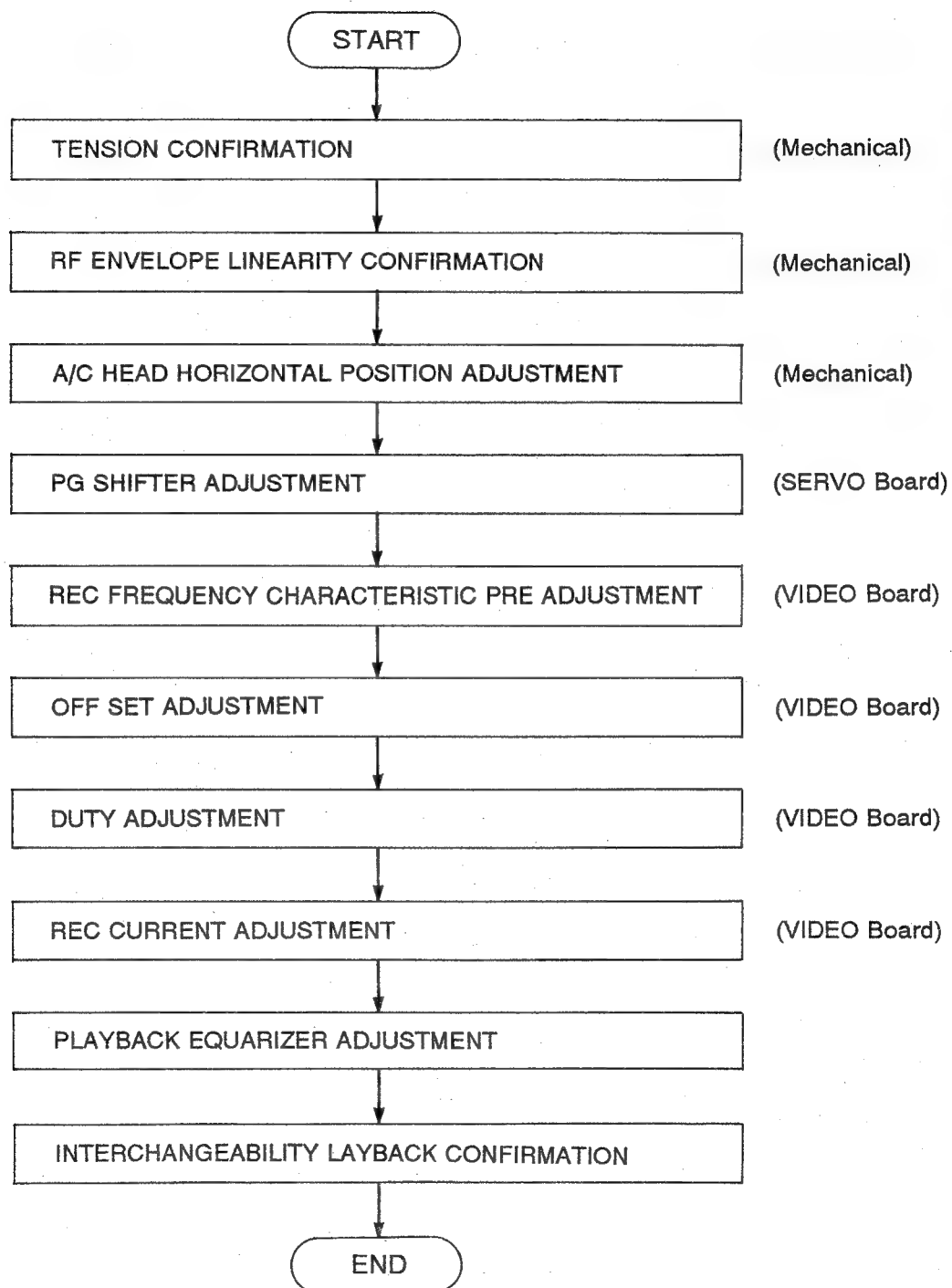


[Installation]

1. Install the new Drum unit following the previous steps in reverse order.

Note: After the Drum unit Replacement, interchange ability adjustments are necessary. (Refer to Flow Chart)

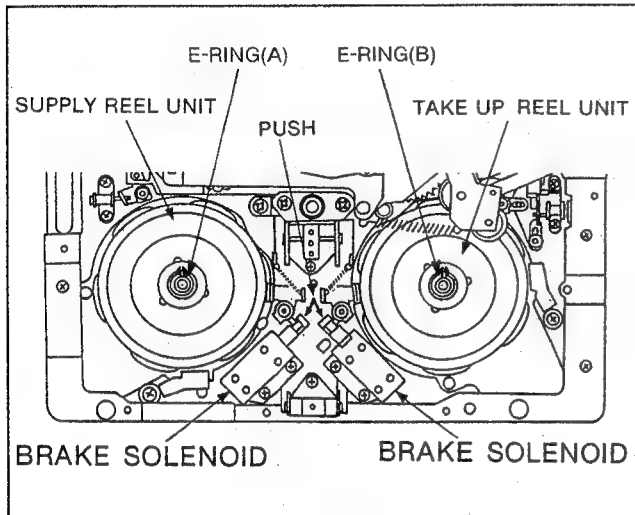
DRUM ELECTRICAL ADJUSTMENT FLOWCHART



6-3. SUPPLY REEL UNIT AND REPLACEMENT

[Removal]

1. Remove the top panel, refer to item 2-3.
2. Remove the cassette carriage, refer to item 2-4.
3. Remove the E-Ring (A) as shown in figure.
4. Push the brake solenoid by hand and remove the supply reel unit.



[Installation]

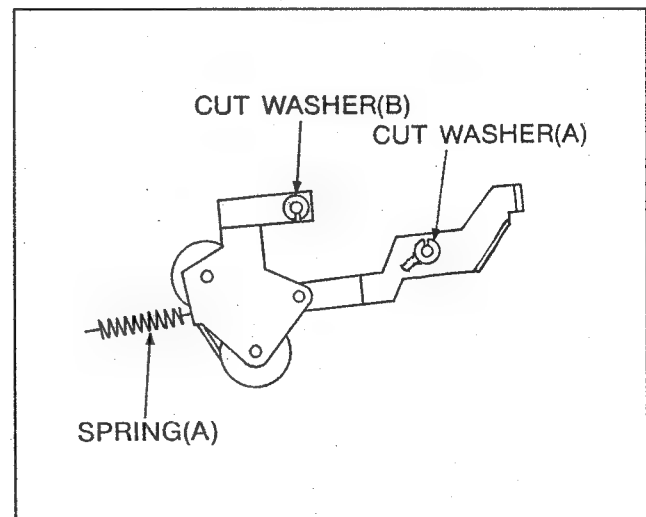
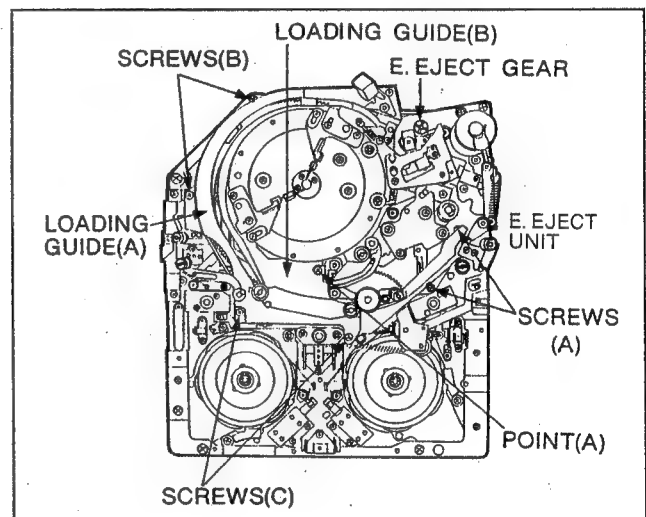
1. Install the new supply and take up reel units following the previous steps in reverse order.

Caution: When install the new reel unit, becarefully do not.

6-4. TAKE UP REEL UNIT REPLACEMENT

[Removal]

1. Remove the top panel, refer to item 2-3.
2. Remove the cassette carriage, refer to item 2-4.
3. Remove the mechanical chassis, refer to item 2-5.
4. Install the screw driver to Manual eject gear and rotate the screw driver to clockwise until loading completion mode.
5. Unscrew the 4 screws (B) and (C) and remove the loading guide (A) as shown in figure.
6. Unscrew the 2 screws (A) and remove the E.Eject unit and float the point (A) and remove the pinch roller guide as shown in figure.
7. Remove the cut washers (A) and (B) and remove the spring (A) and remove the manual eject unit as shown in figure.
8. Remove the E-Ring (B) as shown in figure.



[Installation]

1. Install the new take up reel unit following previous steps in reverse order.

6-5. POST ROLLER UNIT REPLACEMENT

1) POST ROLLER UNIT REPLACEMENT

Note: When you replace a post roller unit, install one at a time, and optimize its position.
(Before replacing any more)

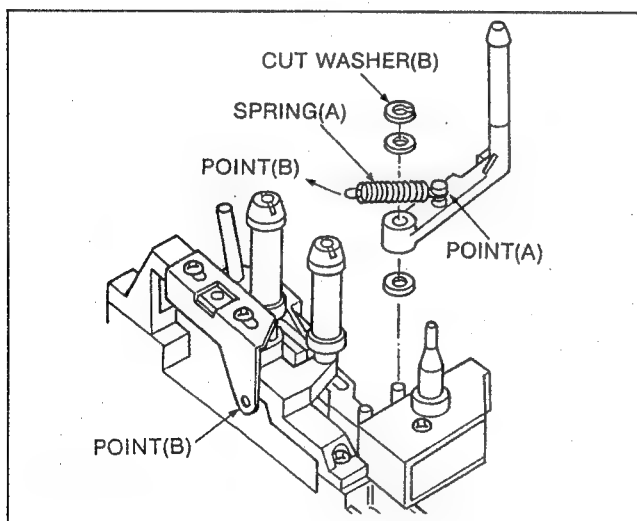
[Removal]

1. Remove the top panel, refer to item 2-3.
2. Only turn the upper flange counterclockwise and remove the upper flange of the post (using post driver outer sleeve). Do not loose the hex screw when the upper flange is removed as shown in figure.
3. Remove the post roller unit (B) (Be sure not to lose the post spring (D) as shown in figure.

6-6. TENSION ARM UNIT REPLACEMENT

[Removal]

1. Remove the top panel, refer to item 2-3.
2. Remove the cassette carriage, refer to item 2-4.
3. Remove the spring (A) and cut washer (B) and pull out the tension arm unit as shown in figure.



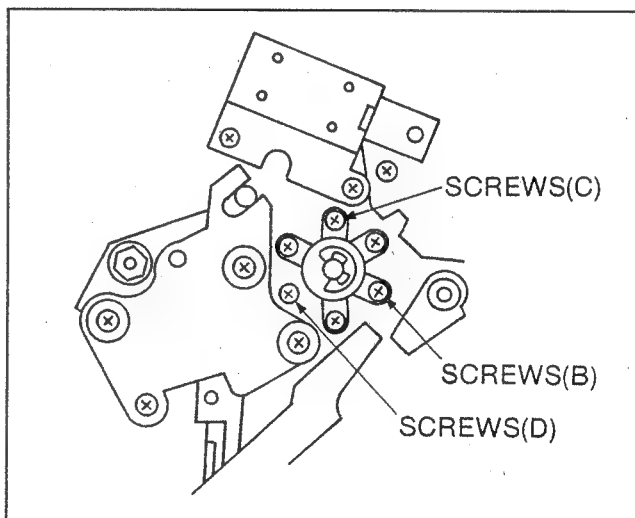
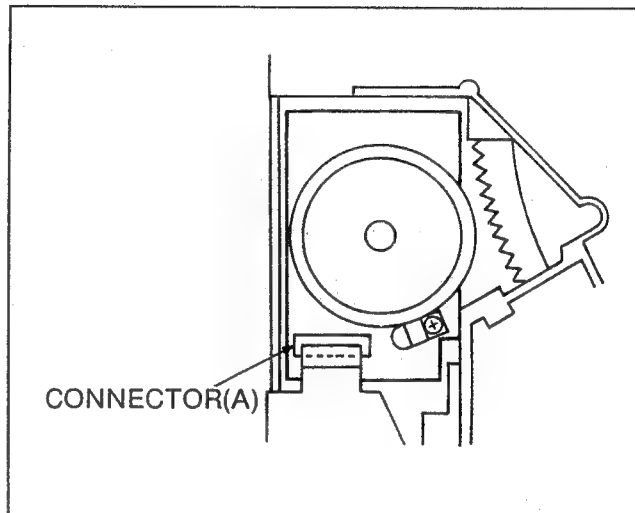
[Installation]

1. Install the new tension arm unit following previous steps in reverse order.
2. Hook the spring (A) to point (A) and point (B) as shown in figure.
3. After installation, confirm that the tension adjustment is required.
4. Finally clean the tension port.

6-7. CAPSTAN UNIT REPLACEMENT

[Removal]

1. Remove the top panel, refer to item 2-3.
2. Remove the cassette carriage, refer to item 2-4.
3. Remove the mechanical chassis refer to item 2-5.
4. Remove the connector (A) on back side of chassis.
5. Unscrew the 3 screws (B)(C)(D) and pull out the capstan unit from back side of chassis as shown in figure.



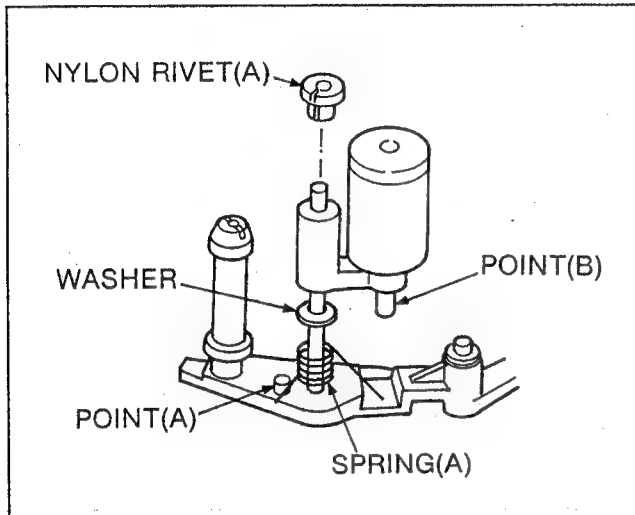
[Installation]

1. Install the new capstan unit following previous steps in reverse order.

6-8. PINCH ROLLER UNIT REPLACEMENT

[Removal]

1. Remove the top panel, refer to item 2-3.
2. Remove the Nylon rivet and pull out the pinch roller unit as shown in figure.
3. Be careful do not lose the washer and spring (A).



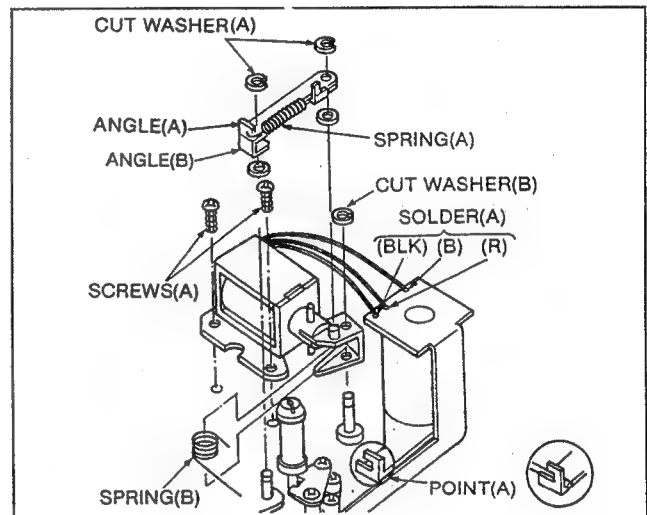
[Installation]

1. Hook the long side of spring (A) to point (B) and short side of spring (A) to point (A) as shown in figure.
2. install the new pinch roller unit following previous steps in reverse order.
3. After installation, clean the roller unit.

6-9. PINCH SOLENOID UNIT REPLACEMENT

[Removal]

1. Remove the top panel, refer to item 2-3.
2. Remove the cassette carriage, refer to item 2-4.
3. Remove the mechanical chassis, refer to item 2-5.
4. Unsolder the (A) portions as shown in figure.
5. Remove the spring (A) and remove the 2 cut washers (A) and remove the angles (A) and (B) as shown in figure.
6. Remove the cut washer (B) and unscrew the 2 screws (A) and remove the pinch solenoid unit.
7. Be careful do not lose the spring (B).



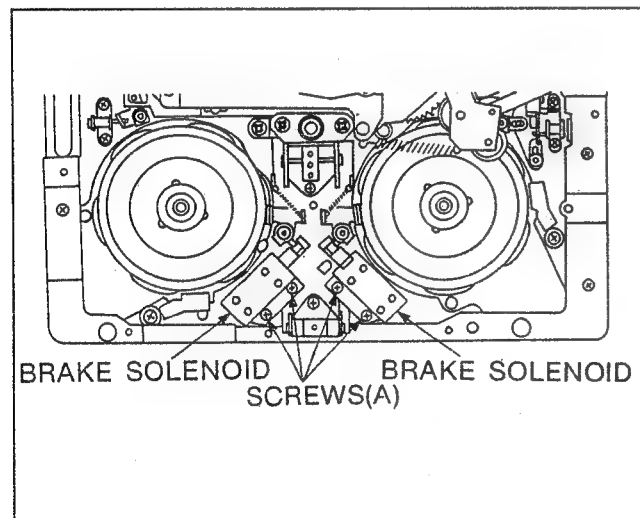
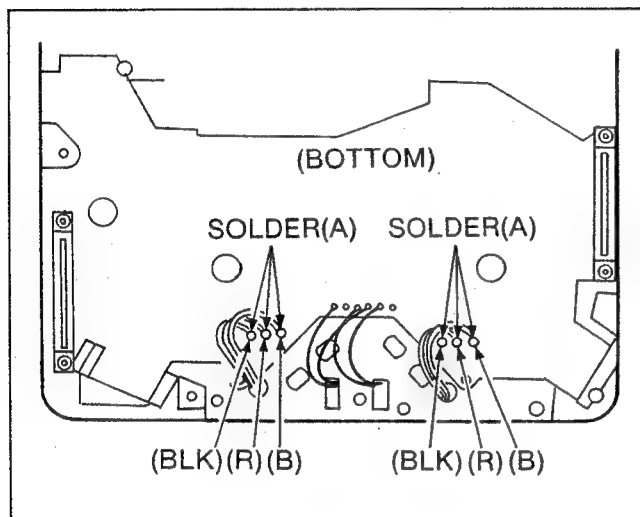
[Installation]

1. Hook the long side of spring (B) to point (A).
2. Install the new pinch solenoid unit following the previous steps in reverse order.

6-10. BRAKE SOLENOID UNIT REPLACEMENT

[Removal]

1. Remove the top panel, refer to item 2-3.
2. Remove the cassette carriage, refer to item 2-4.
3. Remove the mechanical chassis, refer to item 2-5.
4. Unsolder the 6 portions on the back side of chassis (A) and unscrew the 4 screws (A) and remove the supply and take up brake solenoid unit as shown in figure.



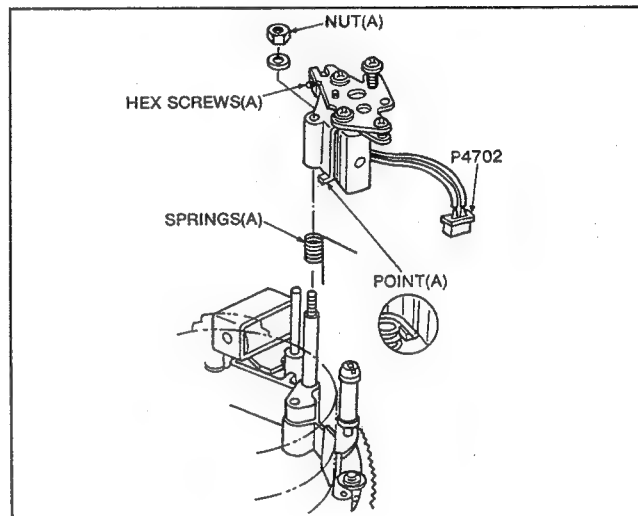
[Installation]

1. Install the new brake solenoid following the previous steps in reverse order.

6-11. A/C HEAD UNIT REPLACEMENT

[Removal]

1. Remove the top panel, refer to item 2-3.
2. Remove the cleaner roller unit.
3. Remove the connector P4702 on the FE/BIAS OSC P.C.Board.
4. Loosen the Hex screw (A) and unscrew the nut (A) and remove the A/C Head unit as shown in figure.
5. Gently pull out the A/C Head unit and becarefully do not lose the spring (A).



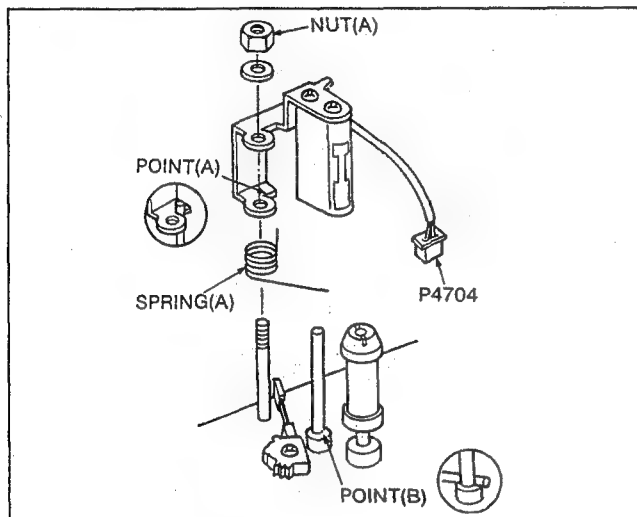
[Installation]

1. Hook the long top of spring (A) to point (A).
2. Install the new A/C head unit following the previous steps in reverse order.
3. After installation, A/C Head mechanical adjustment is required.

6-12. MR HEAD UNIT REPLACEMENT

[Removal]

1. Remove the top panel, refer to item 2-3.
2. Remove the cassette carriage, refer to item 2-4.
3. Remove the E-Eject unit, refer to item 6-4.
4. Disconnect the connector P4704 on the FE/BIAS OSC P.C.Board.
5. Unscrew the nut (A) and pull out the MR head unit as shown in figure.
6. Be careful not to lose the spring (A).



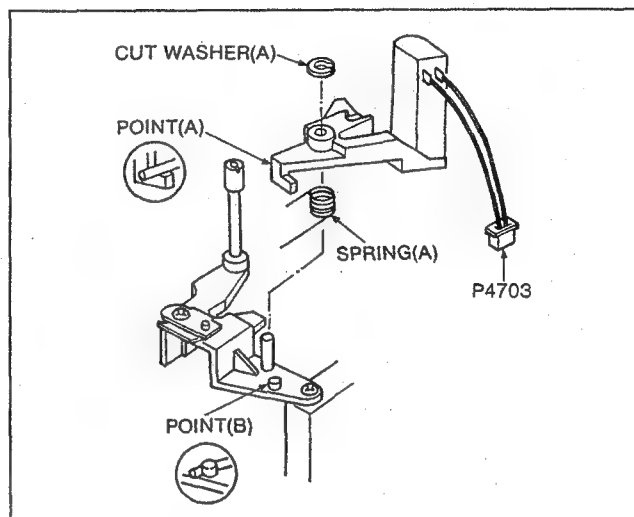
[Installation]

1. Hook the long side of spring (A) to point (B) and the short side of spring (A) to point (A) as shown in figure.
2. Install the new MR head unit following previous steps in reverse order.
3. After installation, clean the MR head.

6-13. FE HEAD UNIT REPLACEMENT

[Removal]

1. Remove the service cover, refer to item 2-2.
2. Disconnect the connector P4703 on the FE/BIAS OSC P.C.Board.
3. Remove the cut washer and pull out the FE head unit as shown in figure.
4. Be careful not to lose the spring (A).



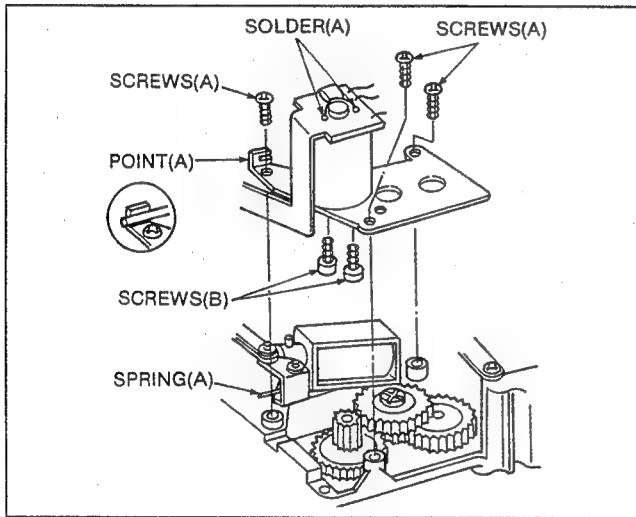
[Installation]

1. Hook the long side of spring (A) to point (B) and the short side of spring (A) to point (A) as shown in figure.
2. Install the new FE head unit following previous steps in reverse order.
3. After installation, clean the FE head.

6-14. LOADING MOTOR UNIT REPLACEMENT

[Removal]

1. Remove the top panel, refer to item 2-3.
2. Remove the cassette carriage, refer to item 2-4.
3. Remove the mechanical chassis, refer to item 2-5.
4. Unsolder the (A) portion and remove the spring (A) as shown in figure.
5. Unscrew the 3 screws (A) and remove the loading motor unit with plate as shown in figure.
6. Unscrew the 2 screws (B) and remove the loading motor unit as shown in figure.



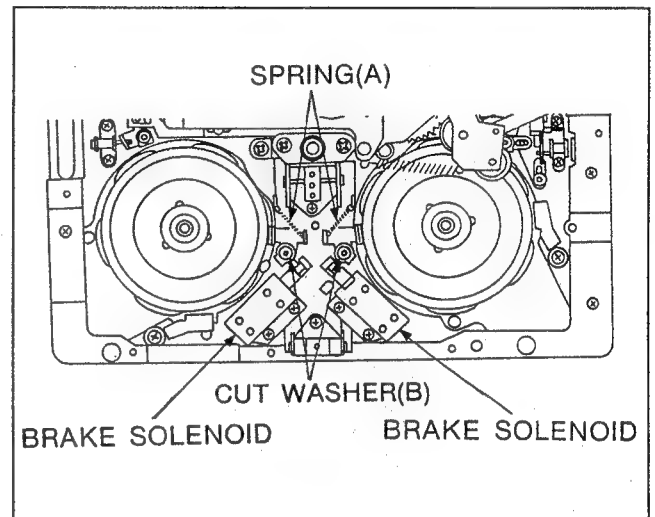
[Installation]

1. Install the new loading motor unit following previous steps in reverse order.

6-15. SUPPLY AND TAKE UP BRAKE UNIT

[Removal]

1. Remove the top panel, refer to item 2-3.
2. Remove the cassette carriage, refer to item 2-4.
3. Remove the brake solenoid unit, refer to item 6-10.
4. Remove the 2 springs (A) and remove the cut washers (B) and pull out the brake unit as shown in figure.



[Installation]

1. Install the new brake unit following the previous steps in reverse order.

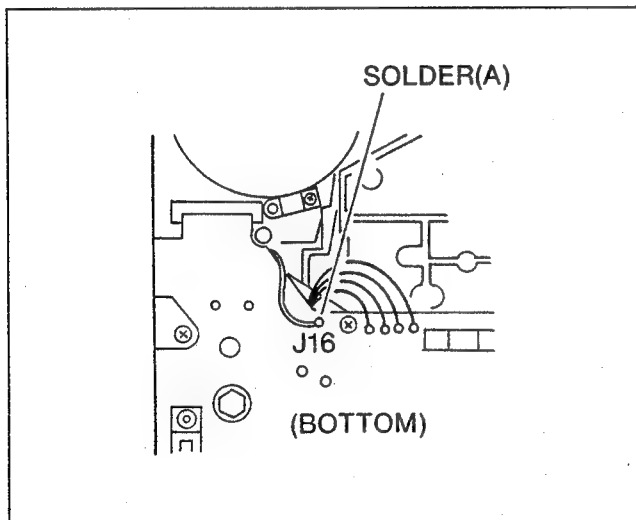
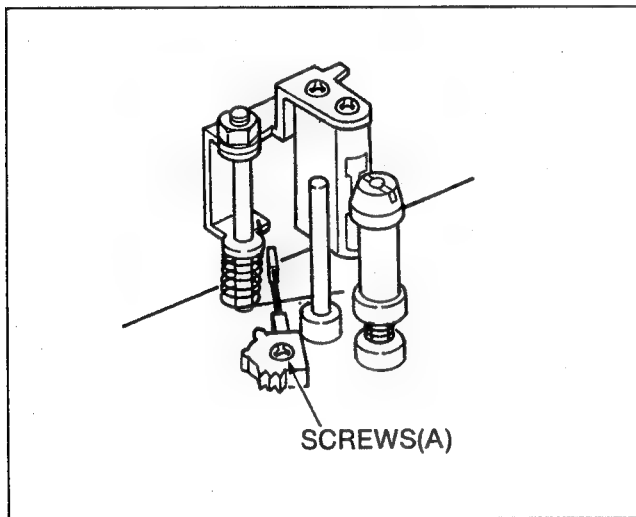
6-16. LEAF SWITCH REPLACEMENT

[Removal]

1. Remove the top panel, refer to item 2-3.
2. Remove the mechanical chassis, refer to item 2-5.
3. Remove the E-Eject unit and the MR head, refer to item 6-12.
4. Unsolder the A portion and unscrew the screw (A) and remove the leaf switch.

[Installation]

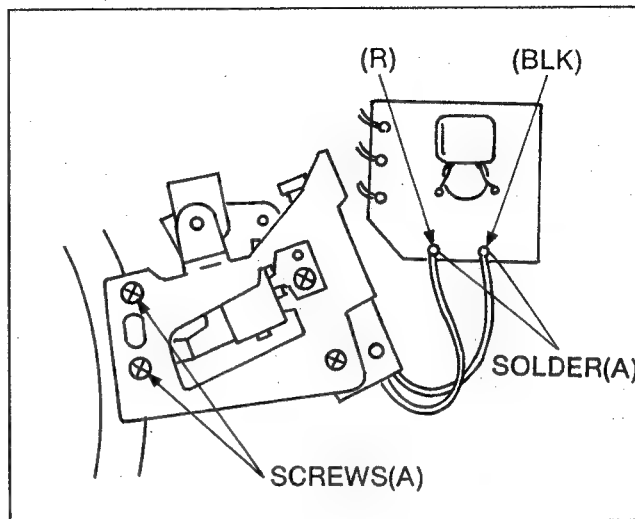
1. Install the new leaf switch following the previous steps in reverse order.



6-17. CLEANER ROLLER UNIT REPLACEMENT

[Removal]

1. Remove the service cover, refer to item 2-2.
2. Unsolder the 2 portions (A) and unscrew the 2 screws (B) and remove the cleaner roller unit as shown in figure.



7. CENTER DRUM UNIT REPLACEMENT PROCEDURE

1. DISMOUNT OF HEAD CLEANER UNIT
2. MOVE BRUSH UNIT POSITION
3. DISMOUNT UPPER CYLINDER UNIT
4. REMOVAL OF AIR SHIELD (S),(M)
5. DISMOUNT CENTER DRUM UNIT
6. ECCENTRICITY OF CENTER DRUM UNIT
7. FIT CENTER DRUM UNIT ON THE LOWER DRUM UNIT
8. PUT AIR SHIELD (S),(M)
9. INSTALLATION OF UPPER CYLINDER UNIT
10. INSTALLATION OF BRUSH UNIT
11. PRE-INSTALLATION OF HEAD CLEANER UNIT
12. ADJUSTMENT AND INSTALLATION OF HEAD CLEANER UNIT
13. FOLLOW MECHANICAL AND ELECTRICAL ADJUSTMENT PROCEDURE

7-1. Dismount of Head Cleaner Unit

- 1) Remove two pieces of screw (a).
- 2) Remove Head Cleaner Unit from cylinder unit as shown in figure 7-1-1.

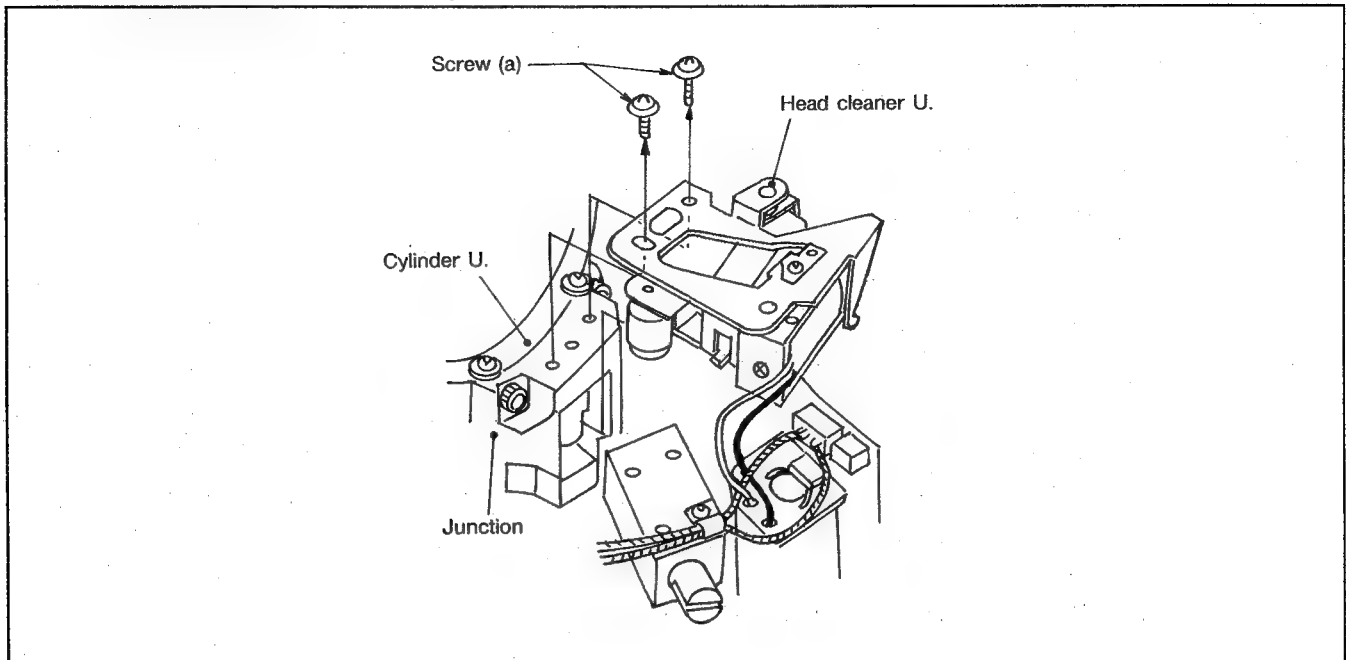


Fig. 7-1-1

7-2. Dismount of P8 Tape Stopper

- 1) Remove one piece of screw (a).
- 2) Remove P8 Tape Stopper from A/C Head unit.
- 3) Tighten the Screw (a) without P8 Tape Stopper as shown figure 7-2-1.

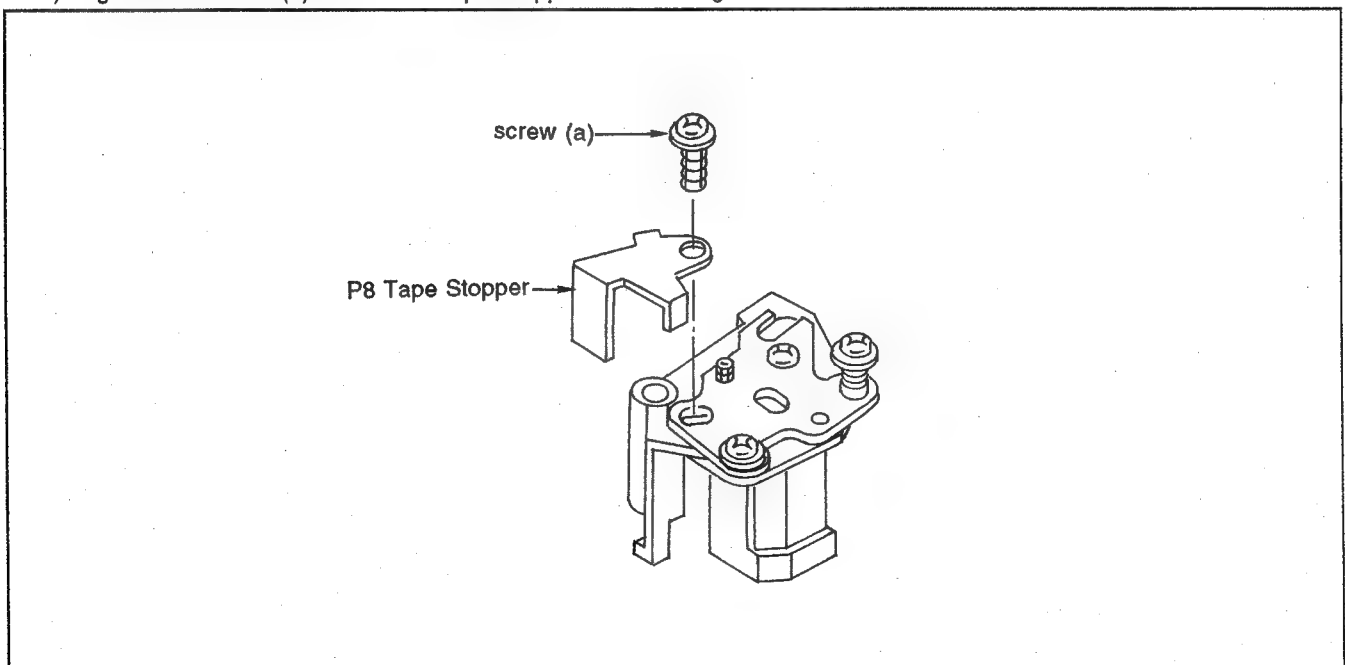


Fig. 7-2-1

7-3. Move Brush Unit Position on Upper Drum Unit

- 1) Remove two connectors from Brush Unit as shown in figure 7-3-1.
- 2) Loosen four pieces of screw (b) and move the Brush Unit position horizontally until the Brushes are free from Slip Ring as shown in figure 7-3-2.
- 3) Pre-tighten four pieces of screw (b) and fix the Brush Units on the Upper Drum Unit.

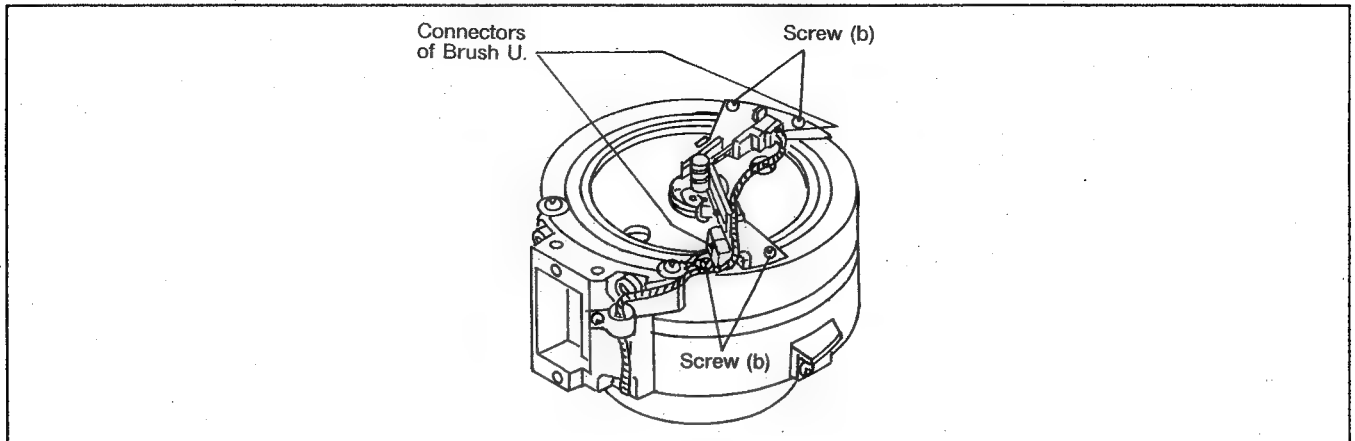


Fig. 7-3-1

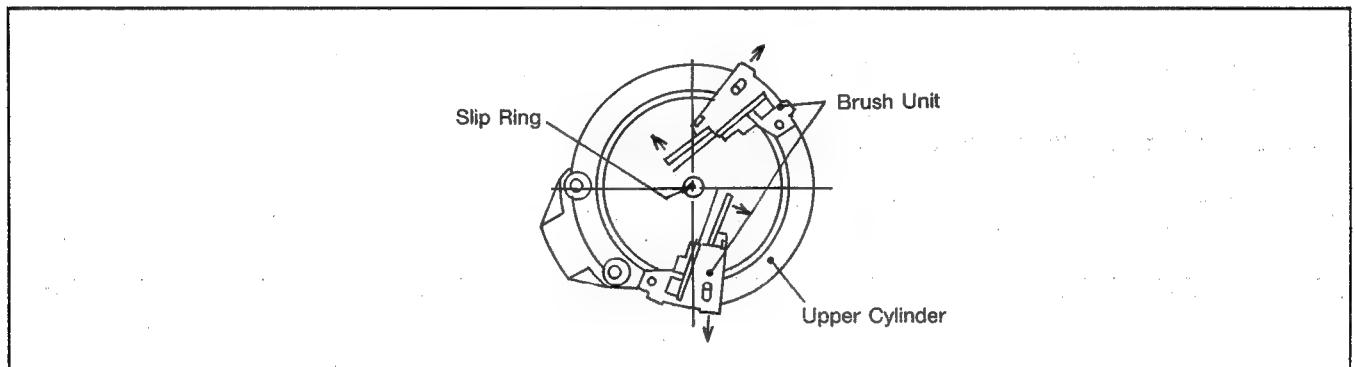


Fig. 7-3-2

7-4. Dismount Upper Cylinder Unit

- 1) Remove 2 pcs of screw (c) and washer (d),(e) as shown in figure 7-4-1.
- 2) Remove the Upper Cylinder Unit.

Note : Be careful so as not drop the washer (d) and (e) when removing the screw (c).

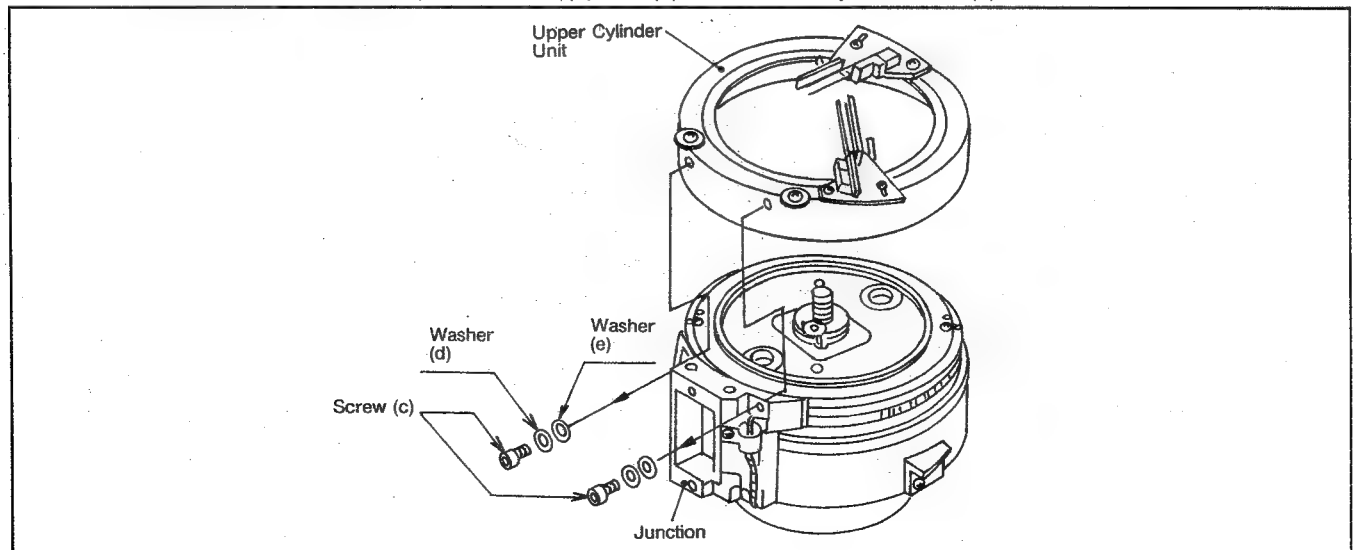


Fig. 7-4-1

7-5. Removal of Air Shield (S),(M)

- 1) Remove 4 pcs of Air Shield (S) and a Air Shield (M) from Center Drum Unit as shown in figure 7-5-1.

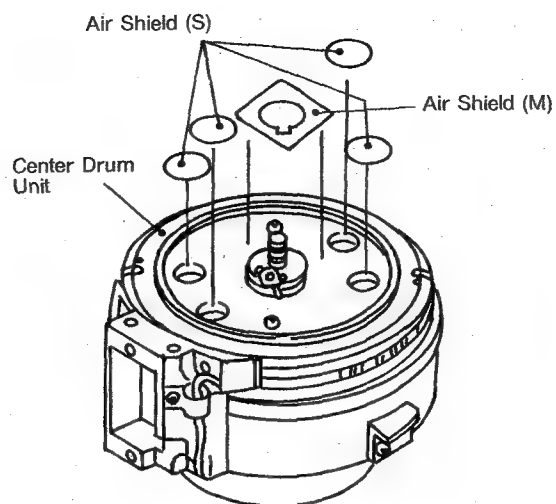


Fig. 7-5-1

7-6. Dismount Center Drum Unit

- 1) Remove 4 pcs of screw (f) as shown in figure 7-6-1.
- 2) Remove Center Drum Unit.

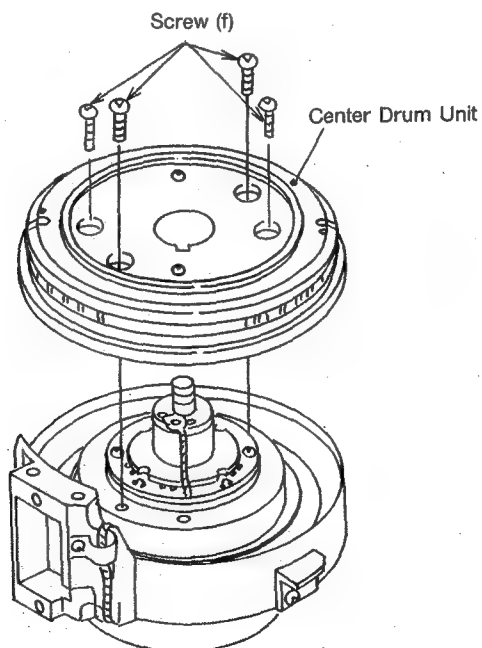


Fig. 7-6-1

7-7. Eccentricity of Upper Cylinder Unit

The Eccentricity Adjustment Tool (VFK0865/VFK0866) is required for this procedure.

(1) Setting of Pick position of the Eccentricity Adjustment Tool. There are two Pick position. One is used for the Eccentricity Adjustment and the other position is used for the Head Protrusion Measurement. Therefore the pick position must be set to right position for the Eccentricity Adjustment as follows.

- 1) Set the switch lever to make contact with the Pick Adjustment knob gently so that the Pick Adjustment knob is free to adjust pick position.
- 2) Push portion B of the Pick Adjustment knob as shown in figure 7-7-1 so that the Pick turns 90° and confirm that a tip portion of the Pick is set horizontally as shown in figure 7-7-2.

Note : For Head protrusion measurement, a tip portion of the pick must be set vertically. To change the position from the eccentricity position push portion A of the Pick Adjustment knob.

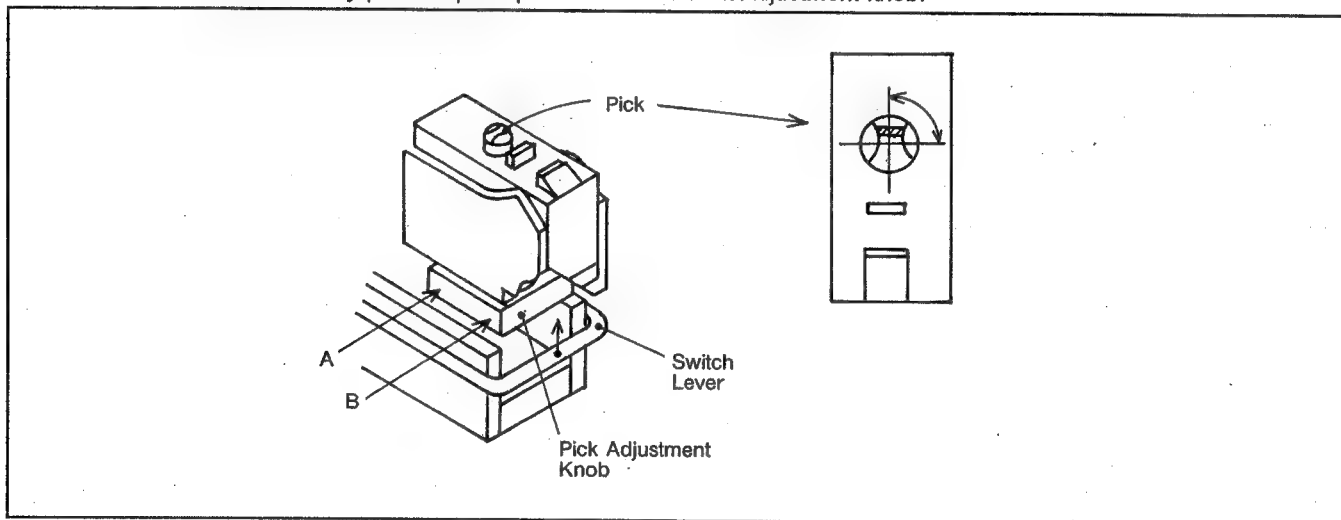


Fig. 7-7-1

Fig. 7-7-2

(2) Turn the Manual Loading Screw clockwise so that Pinch Roller moves to arrow direction as shown in figure 7-7-3.

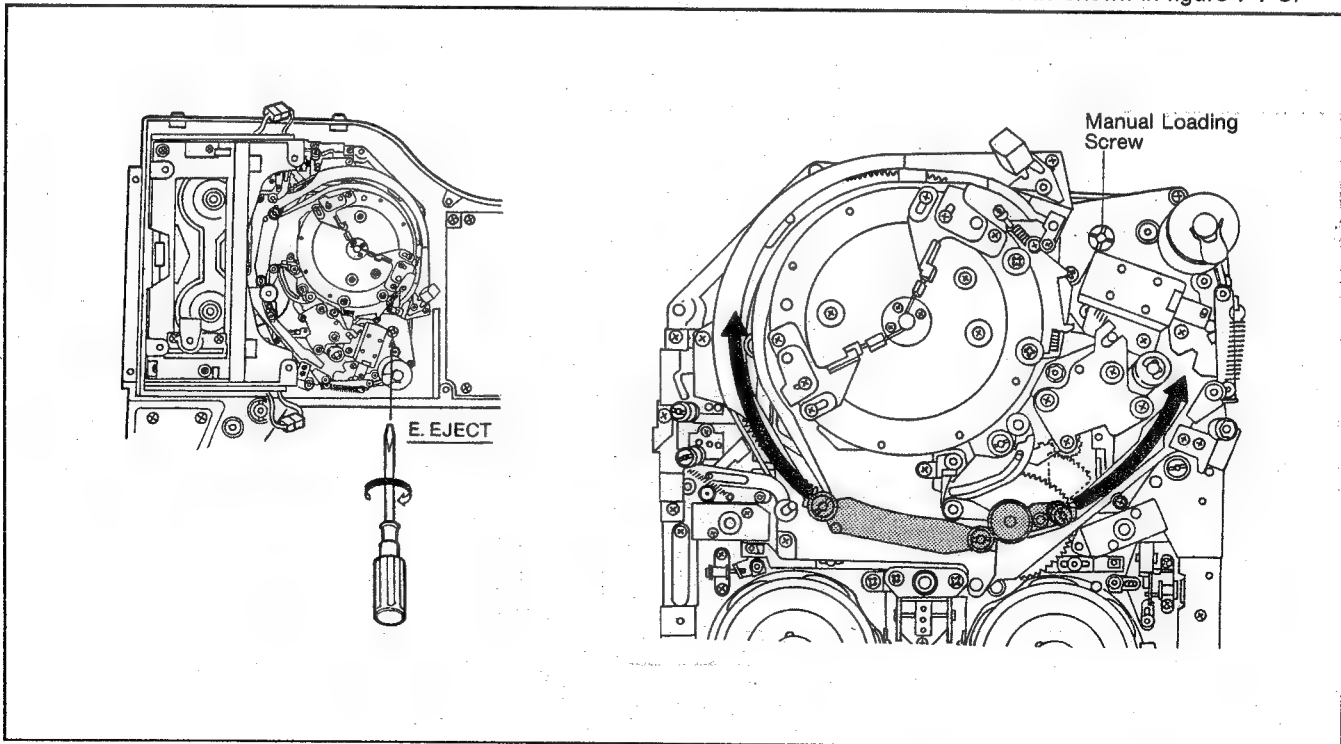


Fig. 7-7-3

(3) Installation of Base Unit of the Eccentricity Adjustment Tool and Center Drum Unit.

1) Install the Base Unit on junction part of Lower Cylinder Unit and tighten stational screws (g) as shown in figure 7-7-4.

Note : R portion of the Base Unit must be properly contact S portion of the Lower Cylinder.

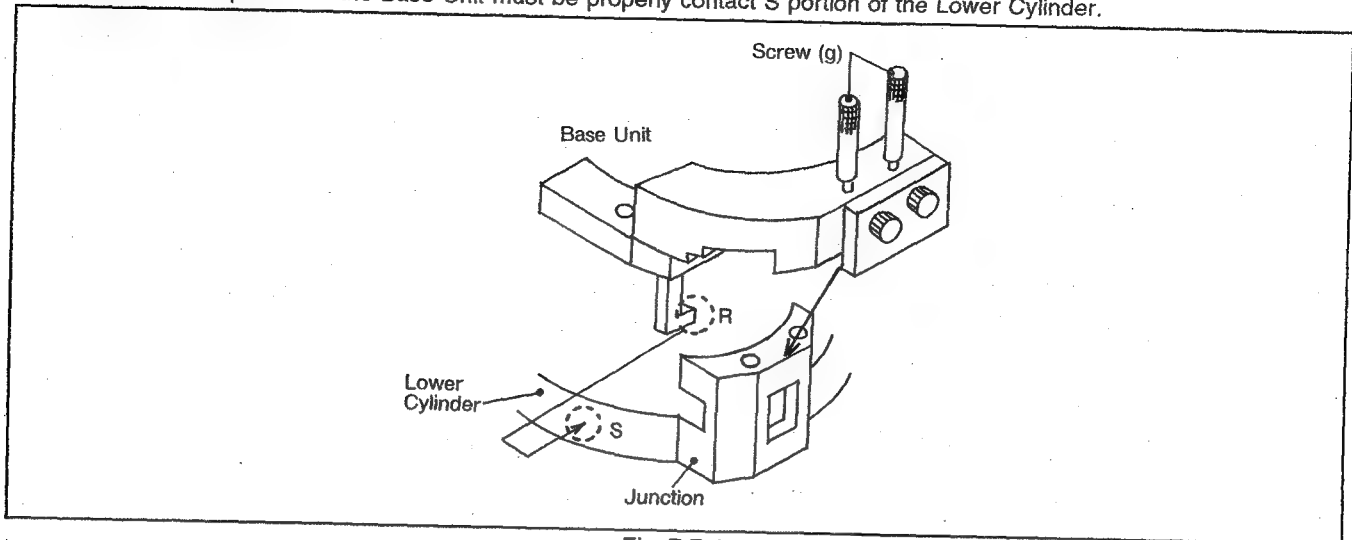


Fig. 7-7-4

2) Mount Center Drum Unit as shown in figure 7-7-5.

- Note :**
- * Clean the following area before installing Center Drum Unit.
Tape path surface of the Lower Cylinder unit.
Disk Upper surface of the Lower cylinder Unit.
Disk upper surface of the Lower Cylinder Unit.
Bottom side of Center Drum Unit Where the Disk upper surface contacts.
 - * Mounting phase between Center Drum and Lower Cylinder must be correct when mounting the Center Drum Unit.
Center Drum Unit : Cutting portion of Center Hole.
Lower Cylinder : Twisted Red/White lead wires on the Disk.
 - * Pre-tight 2 pcs of screw (h) inserted to hole (P).
Other 2 pcs of screws will be used when the Eccentricity Adjustment is completed.

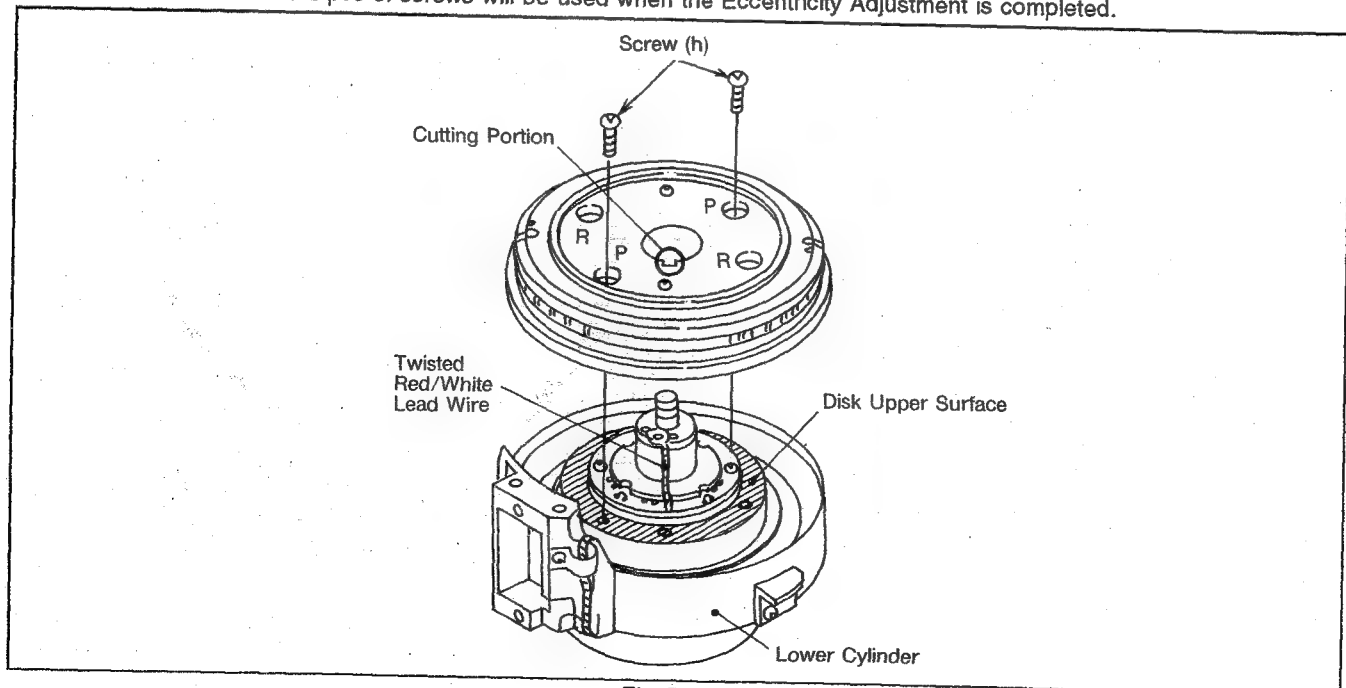


Fig. 7-7-5

(4) Initial setting and Installation of Dial Gauge Unit.

- 1) Before installing the Dial Gauge Unit on the base Unit turn Tilt Adjustment Knob (a) clockwise until the meter of dial gauge swings 20 μm as shown in figure 7-7-6.
- 2) Set a scale of the dial gauge as shown in figure 7-7-7.
- 3) Install the Dial Gauge Unit on the Base Unit tightening a screw (i) as shown in figure 6-10.
- 4) Turn the Tilt Adjustment Knob counterclockwise and the Pick of the Dial Gauge touches to the Center Drum. And stop turning the knob when the meter of dial gauge comes to 0 position.

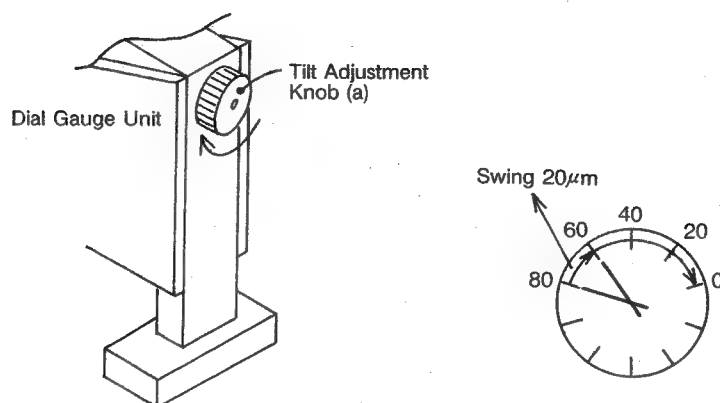


Fig. 7-7-6

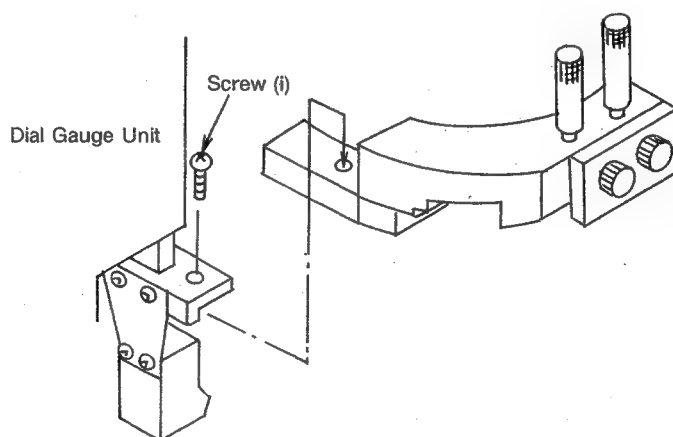


Fig. 7-7-7

(5) Eccentricity Adjustment Procedure

- 1) Rotate the Center Drum that is not concentric with its axis of rotation, the meter will swing back and forth indicating the amount of error as shown in figure 7-7-8.
- 2) Stop rotating the Center Drum when the meter shows minimum reading.
- 3) Adjust the position of the Center Drum by tapping lightly with the plastic handle of a screwdriver on the side of the Drum opposite from the point of measurement as shown in figure 7-7-9. And stop tapping when the meter reads middle of the error amount.
- 4) Repeat 1-3 until the amount of error is within 2 μ m.

Note : Do not tap tape path surface of the Center Drum. The tapping position is as shown in figure 7-7-10.

- 5) Tighten the 2 screws (h) of the Center Drum securely and confirm that the amount of eccentricity error is within 2 μ m.
- 6) After the eccentricity adjustment is completed turn the Tilt Adjustment knob (a) of the Dial Gauge Unit clockwise and disengage the Pick from the center Drum.
- 7) Loosen the a screw (i) and remove the Dial Gauge Unit from the Base Unit. (Refer to figure 7-7-7)
- 8) Remove the Base Unit from the Lower drum Unit. (Refer to figure 7-7-4)
- 9) Turn the manual loading screw counterclockwise so that the mechanism is return to fully unloaded position. (Refer to figure 7-7-3)

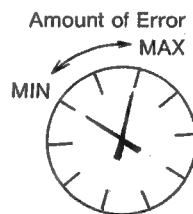


Fig. 7-7-8

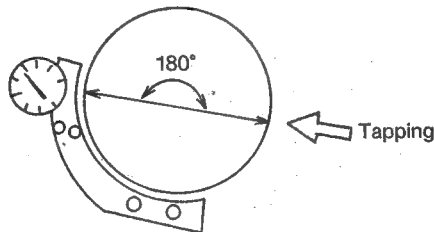


Fig. 7-7-9

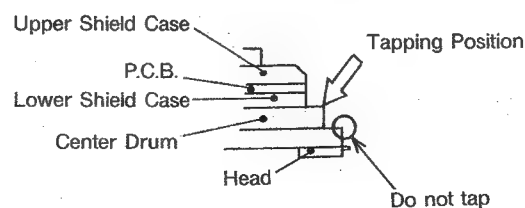


Fig. 7-7-10

- 7-8. Insert 2 screws to Hole (R) of the Center Drum Unit and tighten securely as shown in figure 7-8-1.

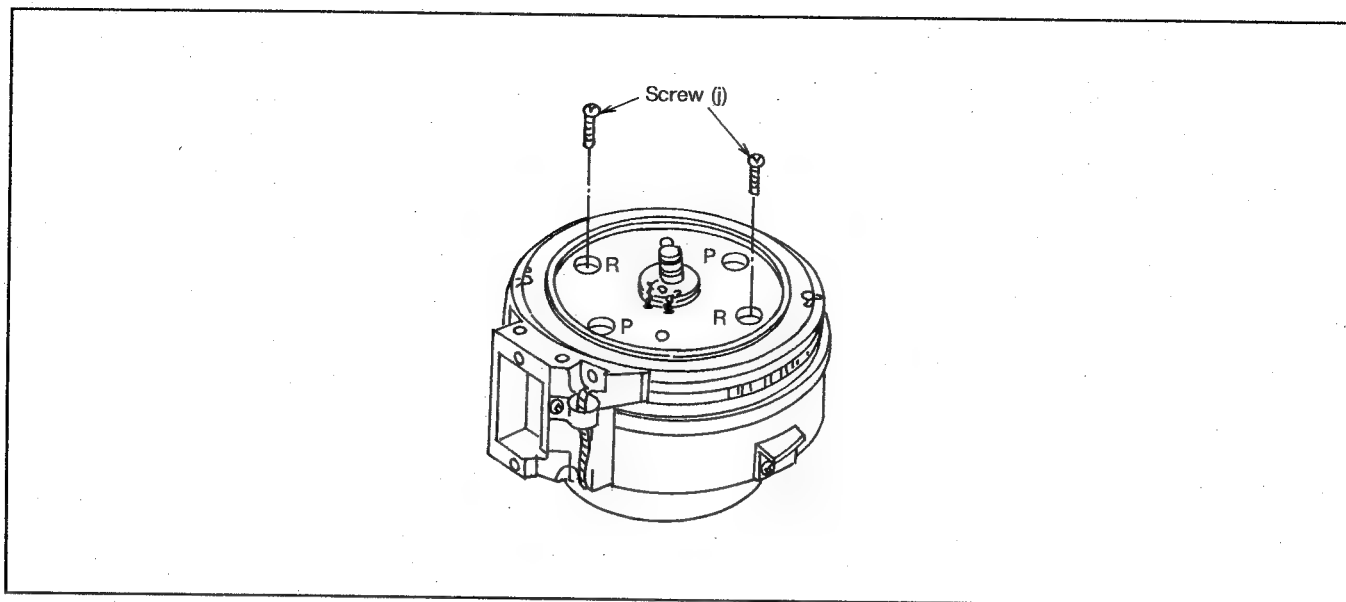


Fig. 7-8-1

- 7-9. Put 4 pcs of air shield(S) and 1 pc of air shield (M) on the Center Drum Unit as shown in figure 7-9-1.

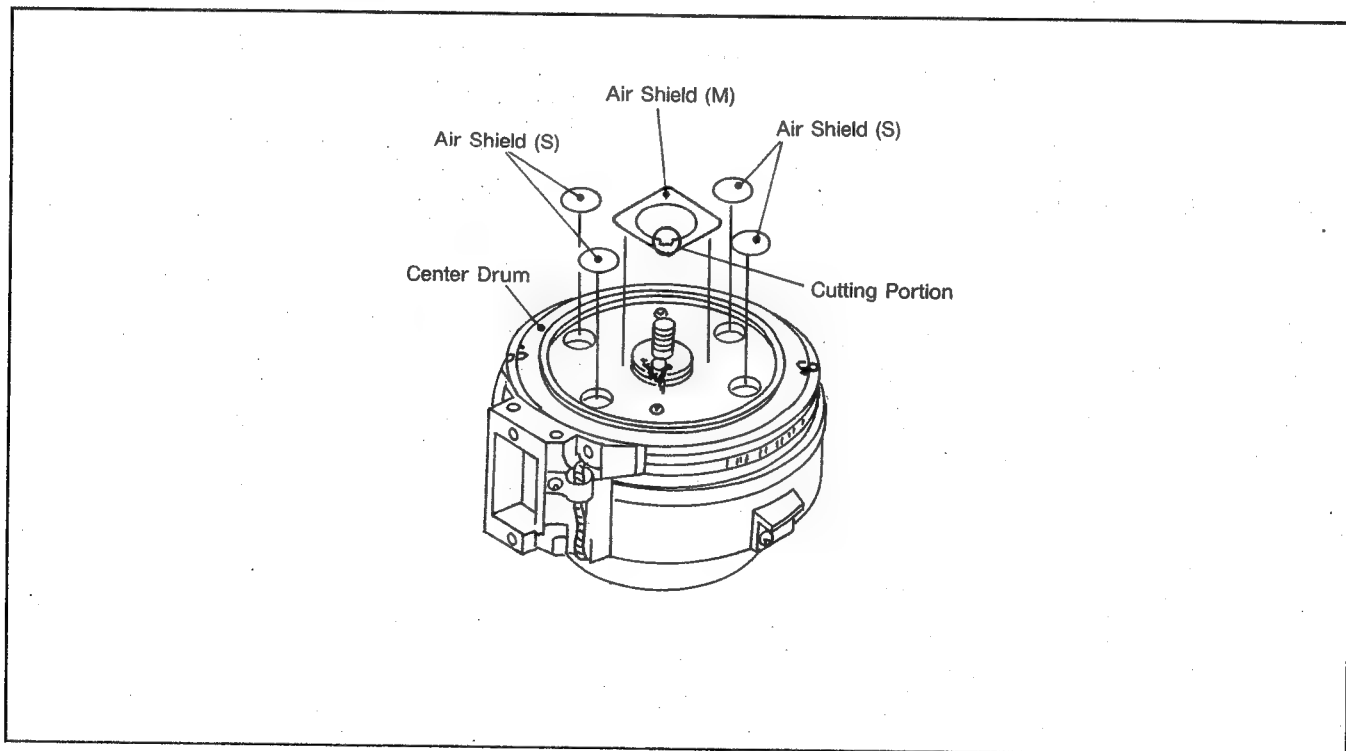


Fig. 7-9-1

7-10. Installation of Upper Cylinder Unit.

- 1) Insert screw (c) and washer (d),(e). Install the upper cylinder and fix it by 2 screws (c) as shown in figure 7-10-1.

Note :

- * A torque driver (VFK0878/0879) is required to tighten the screw (c).
- Torque required is **$4.5 \pm 0.5 \text{ kg-cm}$** .
- * Confirm that two pieces of washer (k) of the upper Cylinder is properly put on the surface of the Junction.
- * Tighten two screws (c) evenly.

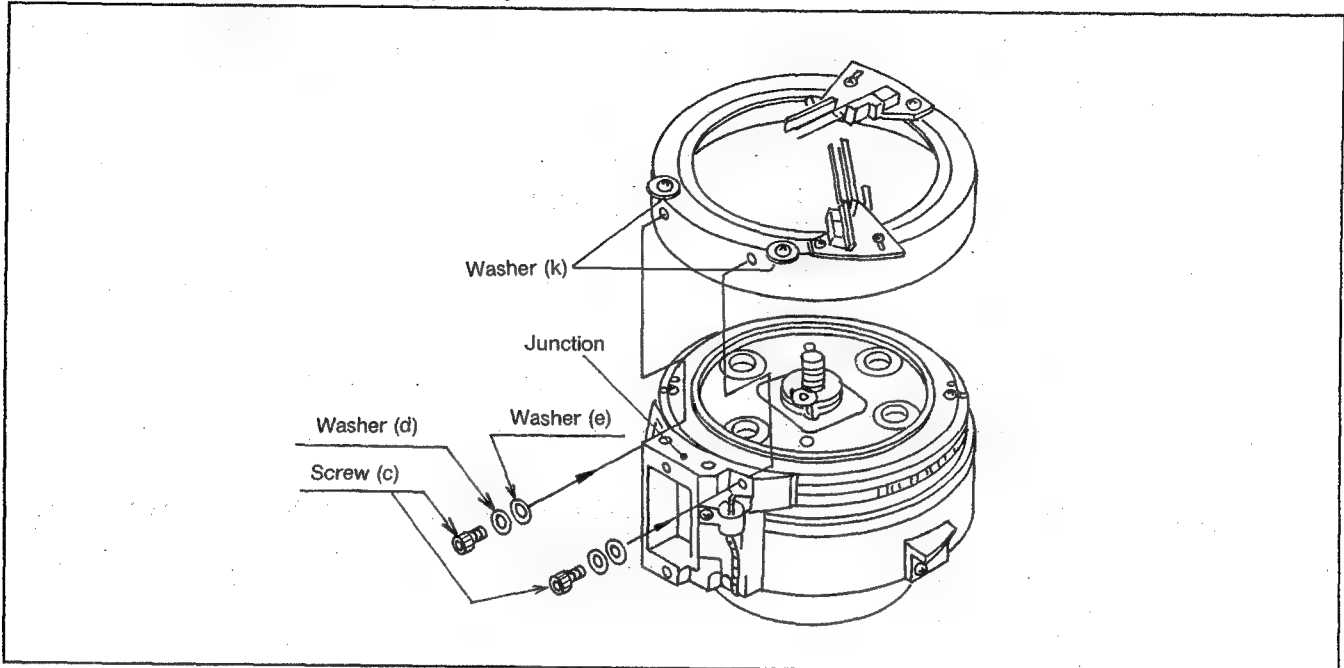


Fig. 7-10-1

7-11. Installation of Brush Unit.

- 1) Loosen 4 screws (b) and adjust the brush unit position so that stopper of the brush unit contact to the upper cylinder. And tighten 4 screws (b) as shown in figure 7-11-2.
- 2) Confirm that the brush contacts to the slip ring properly as shown in figure 7-11-2.
- 3) Connect 2 pcs of connectors to the brush unit.

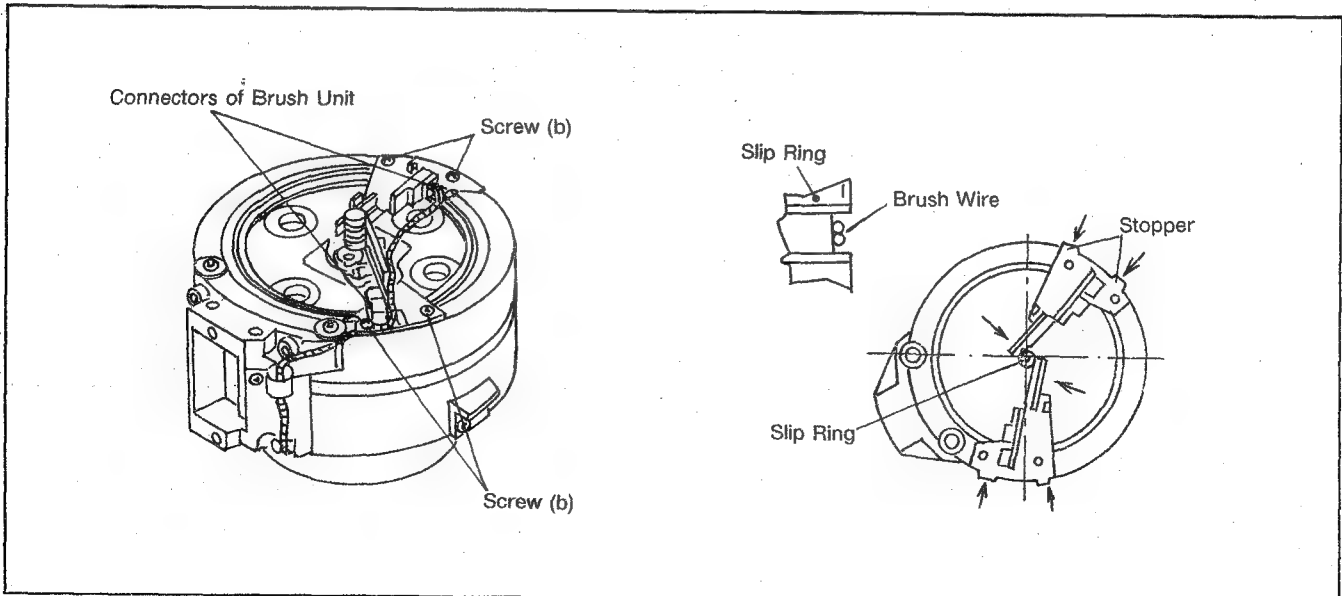


Fig. 7-11-1

Fig. 7-11-2

7-12. Pre-installation of Head Cleaner Unit

- 1) Install the Head cleaner Unit in the junction portion of the Drum so that the cleaner part is fit in the right position of the junction portion as shown in figure 7-12-1.
- 2) Pre tighten 2 screws (a).

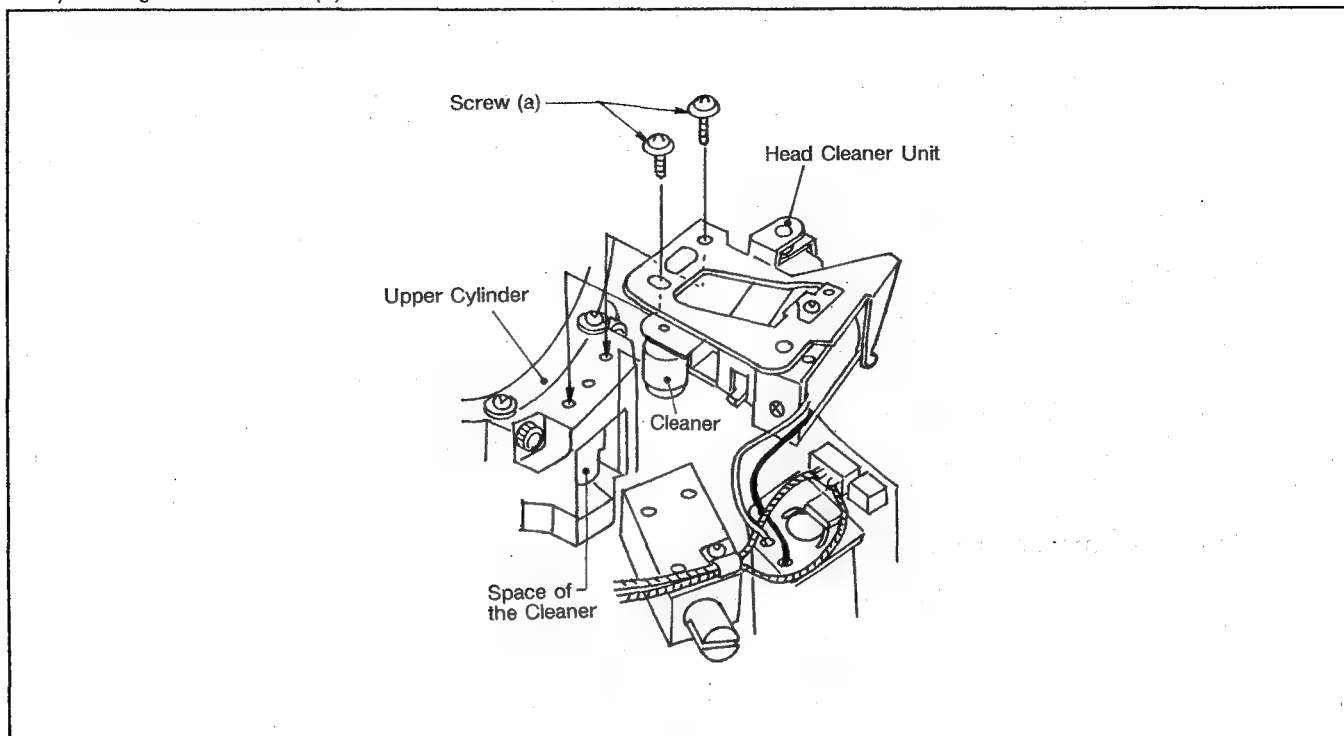


Fig. 7-12-1

7-13. Adjustment of Head Cleaner Unit

- 1) Engage a solenoid of the head cleaner unit by hand.
- 2) Adjust the head cleaner unit position so that A portion is 0.3 - 0.4mm as shown in figure 7-13-1. And tighten 2 screws (a).

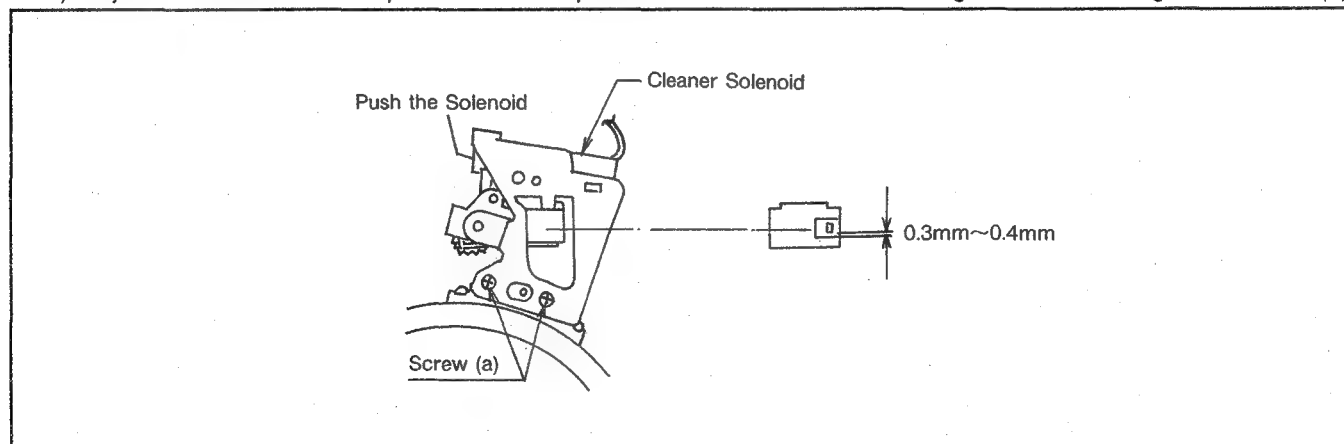


Fig. 7-13-1

8. MECHANICAL AND ELECTRICAL ADJUSTMENT PROCEDURE

The following procedures are required after the Center Drum Replacement is completed.

1. Linearity Confirmation and Adjustment
 2. Rec Head Height Confirmation and Adjustment
 3. A/C Head Azimuth and Height Confirmation and Adjustment
 4. A/C Head Horizontal Position Adjustment
 5. Head Switching Position Adjustment
 6. Confirmation of A/C Head Horizontal Position and A/C Head Height
 7. Playback EQ Adjustment
 8. Rec Current and Rec EQ Adjustment
 9. Final Confirmation of Error Rate
- Measured by Azimuth Time Different Tool

8-1. Linearity and Rec Head Height Measurement Procedure

1. Connection and Setting of Measuring Tool and VTR.

1-1. Connection (Fig 8-1-1,8-1-2)

- 1) Remove P/S Buff P.C.B. from AJ-D310 and install REC HEAD PB P.C.B. JIG.
- 2) Install removed P/S BUFF P.C.B. to REC HEAD PB P.C.B. JIG as shown in figure 1-1.
- 3) Connect cable (1),(2) and (3) as shown in figure 1-2.

	Azimuth Time Difference Tool	REC HEAD PB P.C.B. TOOL
Cable (1)	AT.H.SW	BLACK PIN : GND WHITE PIN : PB CH0 H.SW
Cable (3)	REC HEAD	RED PIN : TP0+ (CH0+) WHITE PIN : TP1+ (CH1+) BLACK PIN : TPG1 (GND)

Cable (2) : OUTPUT TO CPU A/D --- A/D Board on Computer.

- 4) Follow the setting of SW1 ~ 4 on the REC HEAD PB P.C.B. JIG as shown in figure 1-2.
- 5) The switch setting of Azimuth Time Difference Tool is the same as AJ-D350 procedure.

Connection of Azimuth Time Different Tool

Cable (1),Cable (2) : Common with AJ-D350 use
 Cable (3) : VFK0863(NEW FOR AJ-D310,320)
 REC HEAD PB P.C.B. JIG : VFK0854(NEW FOR AJ-D310,320)

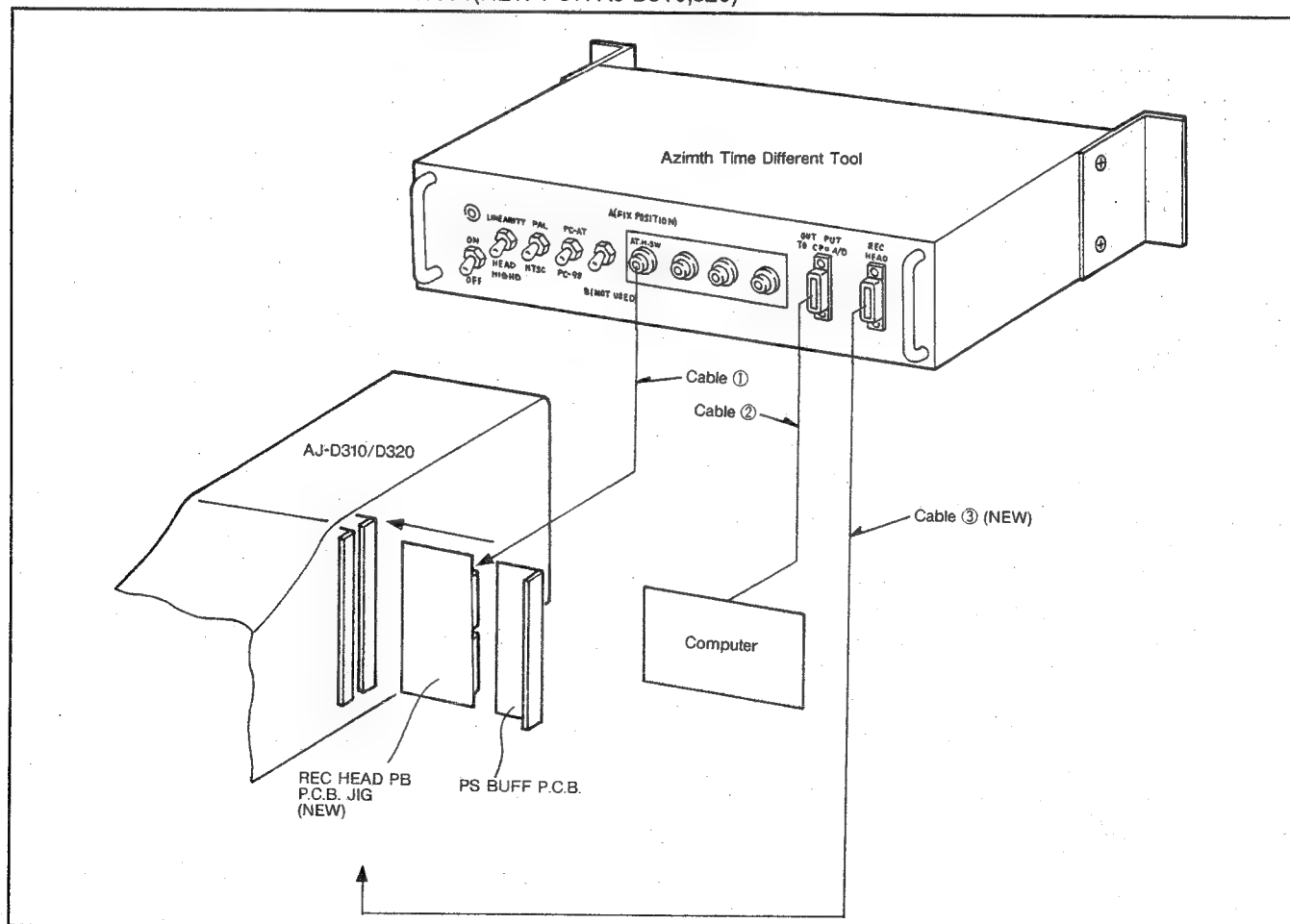


Fig. 8-1-1

Connection of REC HEAD PB P.C.B. TOOL

Switch No.	Description	Setting
SW1	PAL/NTSC	PAL or NTSC
SW2	A: PB HEAD PLAYBACK B: REC HEAD PLAYBACK	B position when 4 pcs screw type Center Drum is mounted.
SW3	AZIMUTH TIME DIFFERENCE ON/OFF	ON : When measuring linearity and REC Head Height by Azimuth Time Difference Tool. OFF : When adjusting linearity, A/C Head and PG Shifter.
SW4	REC/PB OUTPUT	REC position when 4 pcs screw type of Center Drum is mounted.

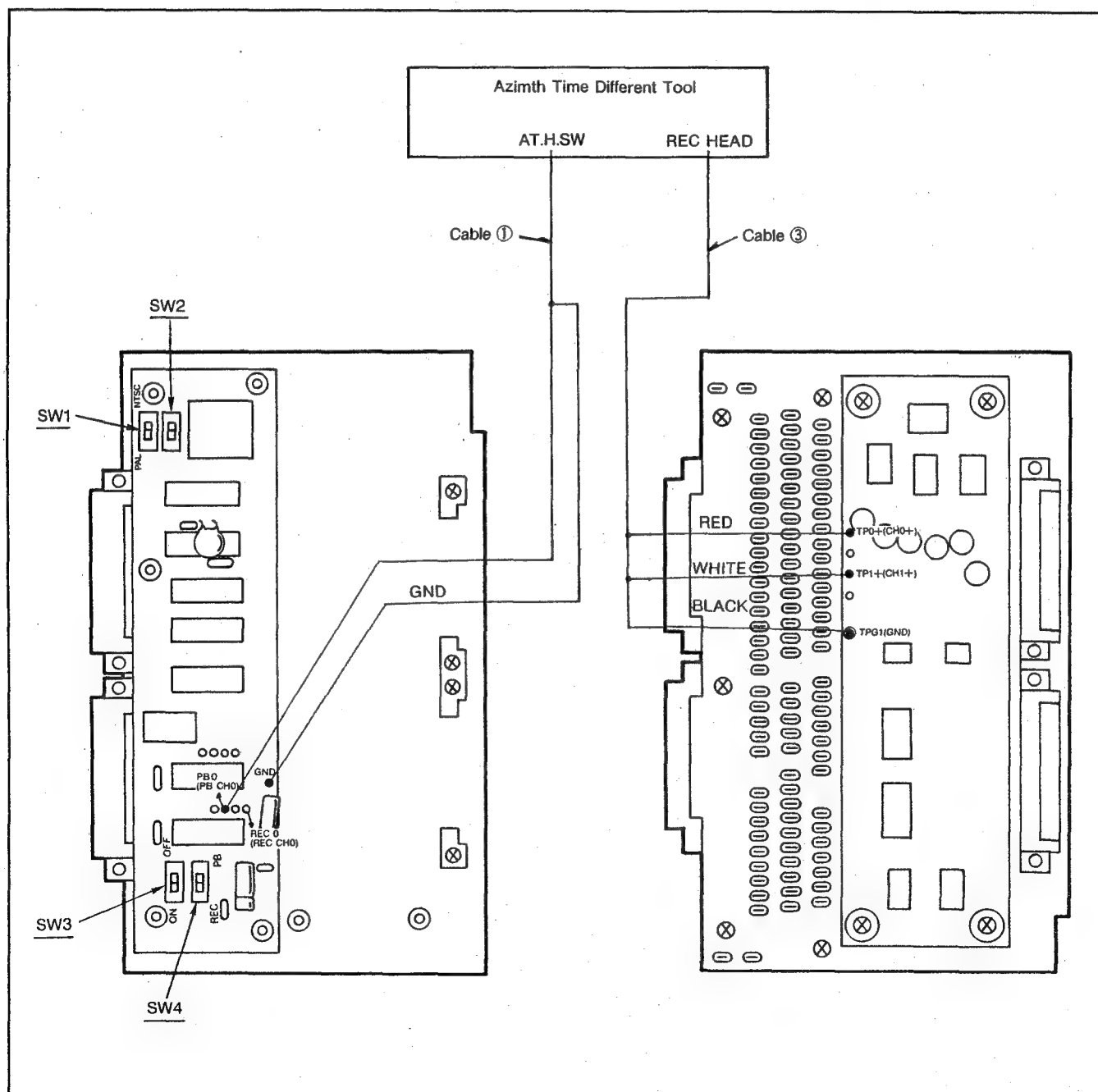


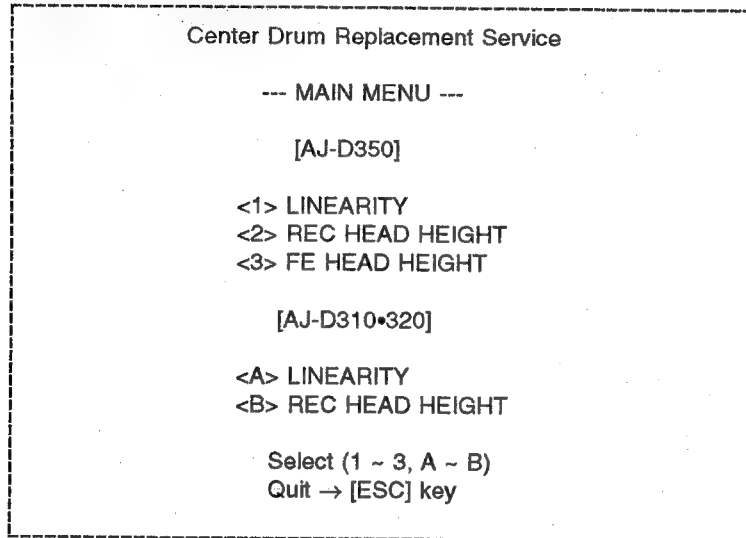
Fig. 8-1-2

8-2. Linearity Measurement Procedure

Alignment Tape : No.3
Mode : Playback
Specification : 4 μ m

- 1) Open the Main Menu on Computer Display as shown below and select <A> LINEARITY.
Operation method of Computer is the same as AJ-D350 Linearity Measurement Procedure.

<Main Menu Display>



- 2) If the linearity is out of specification adjust RF Envelope Linearity (Refer Mechanical Adjustment Procedure).

8-3. REC Head Height Measurement Procedure

Alignment Tape : No.2 Colour Bar shuffling OFF portion
Mode : Loading completed condition (Pinch Roller ON)
Specification : $\pm 1\mu\text{m}$ (0A,0B,1B Head)

- (1) Select REC HEAD HEIGHT on Main Menu of the Computer Display
- (2) Registration/selection of the Alignment Tape Data
- (3) Selection of PAL [0], NTSC [1]
- (4) Measurement Start

- 1) Press <S> key for Measurement Start before inserting the Alignment Tape No.2.
- 2) Insert the Alignment Tape No.2 to the VTR and confirm that Loading is fully completed.
- 3) Rotate capstan shaft slowly by hand so that the peak of Saw Tooth envelope is set to the peak position of Measurement Menu on Computer Display as shown in figure 8-3-1.

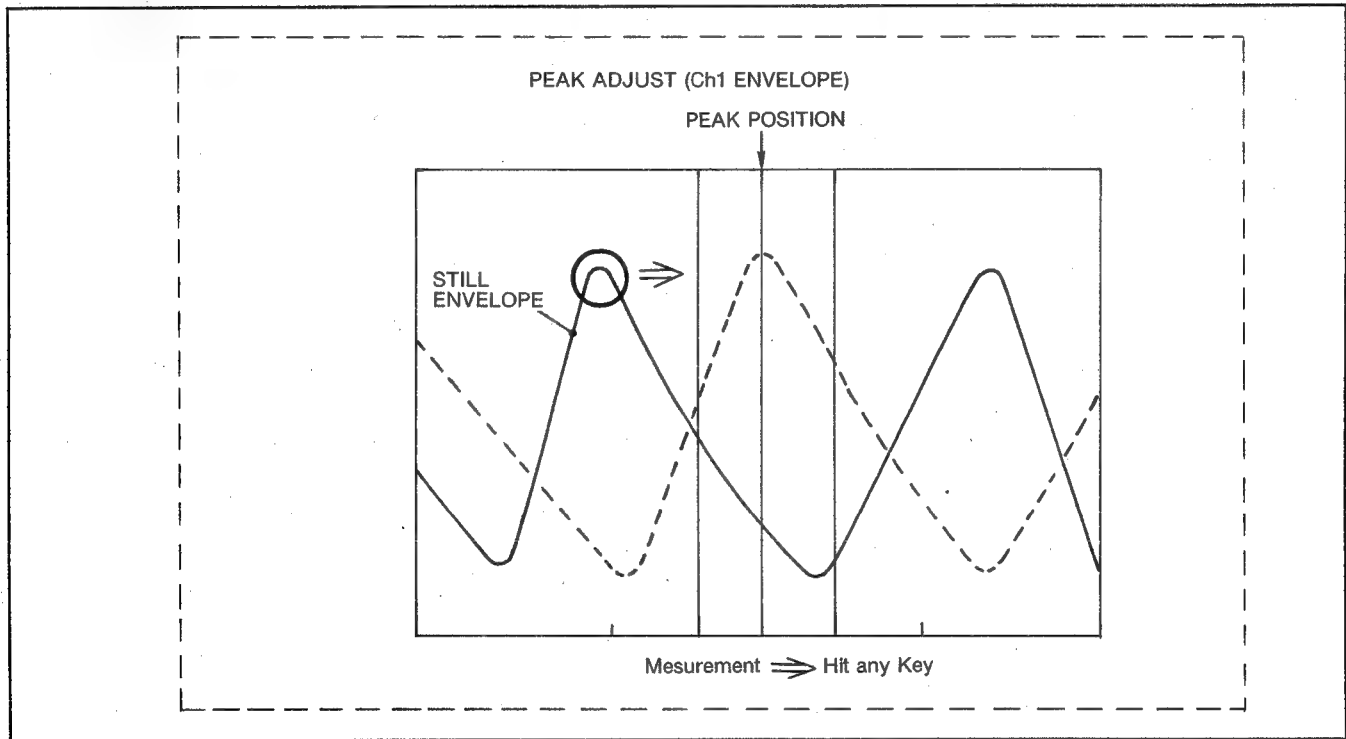


Fig. 8-3-1

- 4) Hit RETURN key for Calculation

Note : Procedure 3) and 4) must be completed within 30 sec after loading is completed as the VTR goes into STAND-BY Mode (Pinch Roller OFF) automatically.

If missed, set VTR power save SW to SAVE → ON position so that VTR comes back to Pinch Roller ON mode. Then repeat Procedure 3) and 4).

- 5) After Calculation, measurement result of REC HEAD HEIGHT 0A,0B,1B is displayed on the menu and confirm that results are within specification.
- 6) If not within specification, eject the Alignment Tape and adjust REC HEAD HEIGHT. And repeat Procedure 1) ~ 5).

8-4. Mechanical Adjustment Procedures

8-4-1. Tape Transportation Posts Name

There are 10 posts Roller with bearing P1, P3, P5, P6, P8, P9 and P10, 3 posts with out bearing and A/C Head.

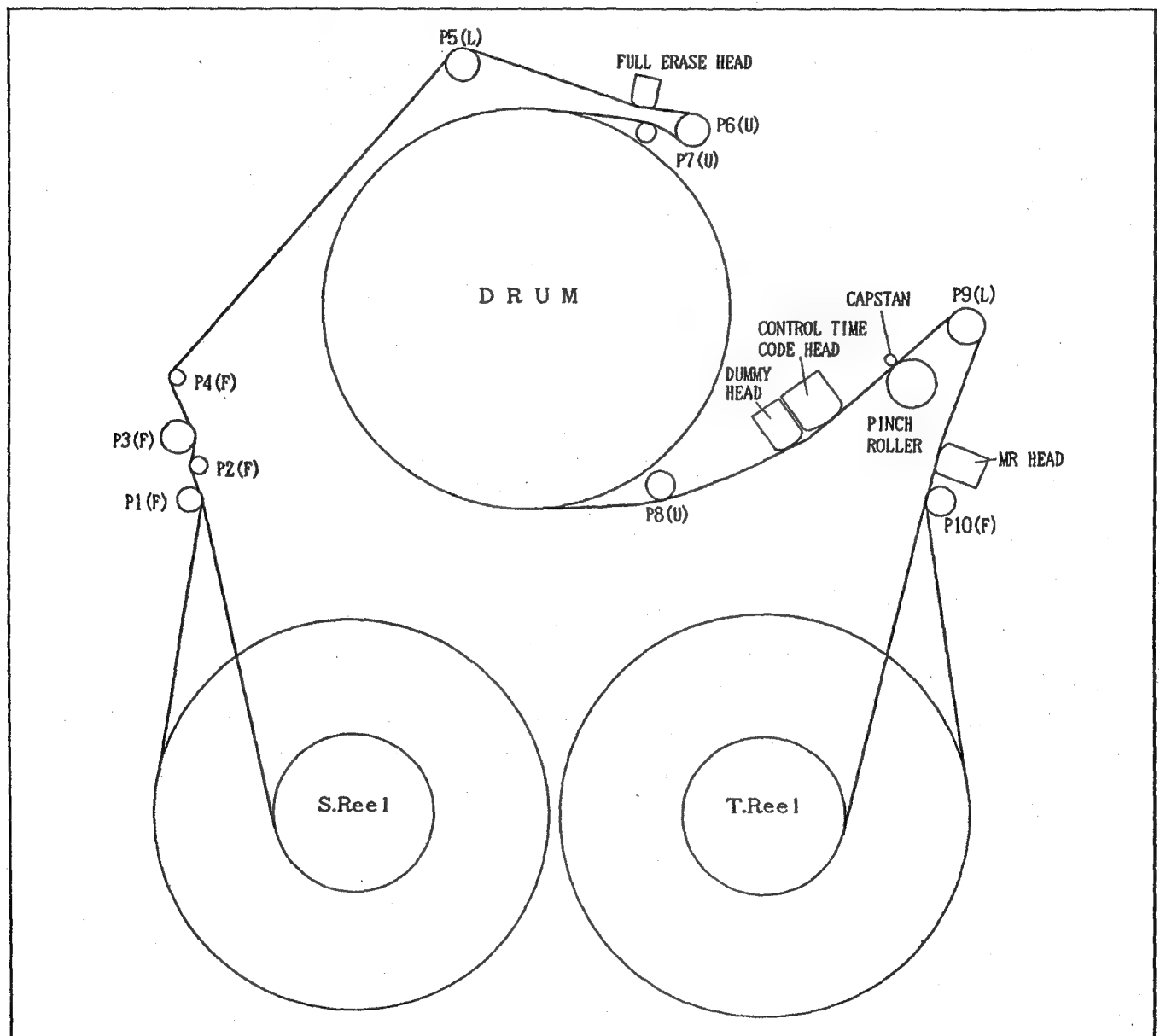
P1, P3, P5 through P10 posts need height adjustment.

P4 post needs tension adjustment and sensor gain adjustment.

A/C head needs tilt adjustment, height adjustment, azimuth adjustment and X value adjustment.

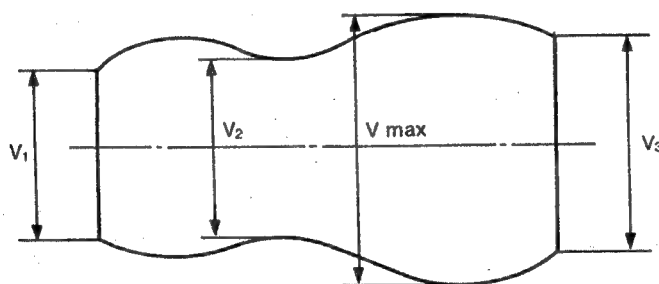
The tilt angle of the A/C head influences the exit portion of RF envelope linearity adjustment.

MR head needs height adjustment for detecting head clog of CTL and Time Code.



8-4-2. RF Envelope Linearity Specification

TEST	TP+ (REC ENV OUT), EXTP65 (H.SW) on REC HEAD AMP P.C.B. TOOL	
SPEC	LINEAR MASTER PLAY	$V1/V_{max}, V2/V_{max}, V3/V_{max} \geq 0.92$
	SELF RECORDING PLAYBACK	$V1/V_{max}, V3/V_{max} \geq 0.9, V2/V_{max} \geq 0.95$
	SELF RECORDING PLAYBACK	Waving of Envelope is less than 5% at maximum envelope portion.
MODE	LINEAR MASTER PLAYBACK	
	SELF RECORDING PLAYBACK (COLOR BAR or MONOSCOPE)	
	ADJUST TRACKING VR and SET ENVELOPE IS MAXIMUM	
TOOL	1. POST DRIVER 2. HEX. WRENCH M2.6	

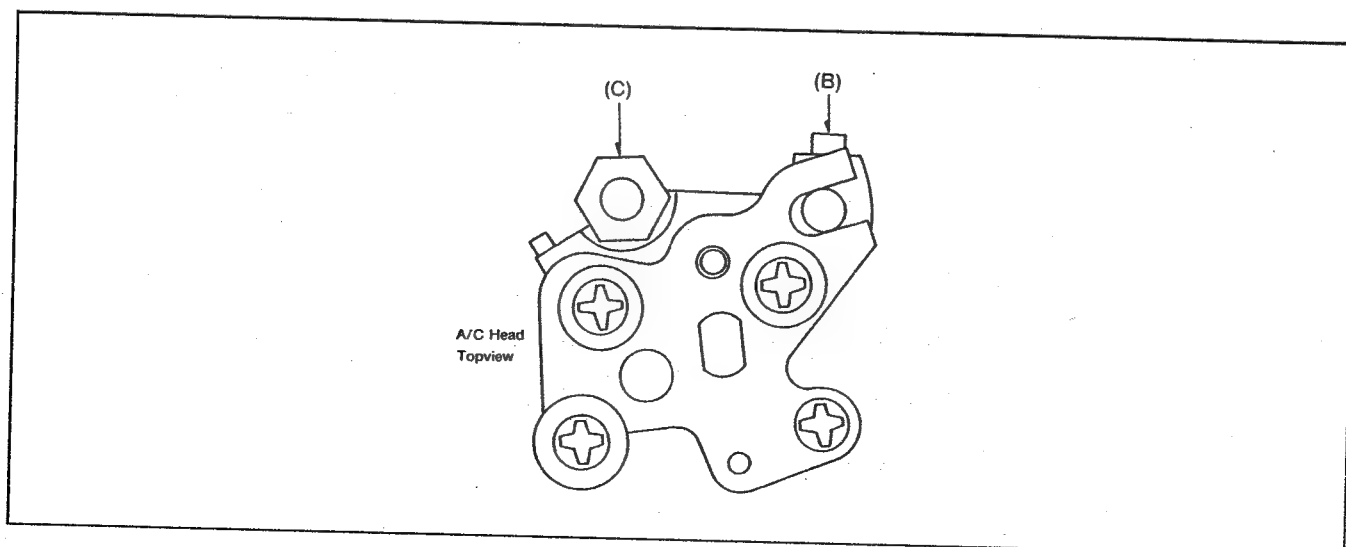
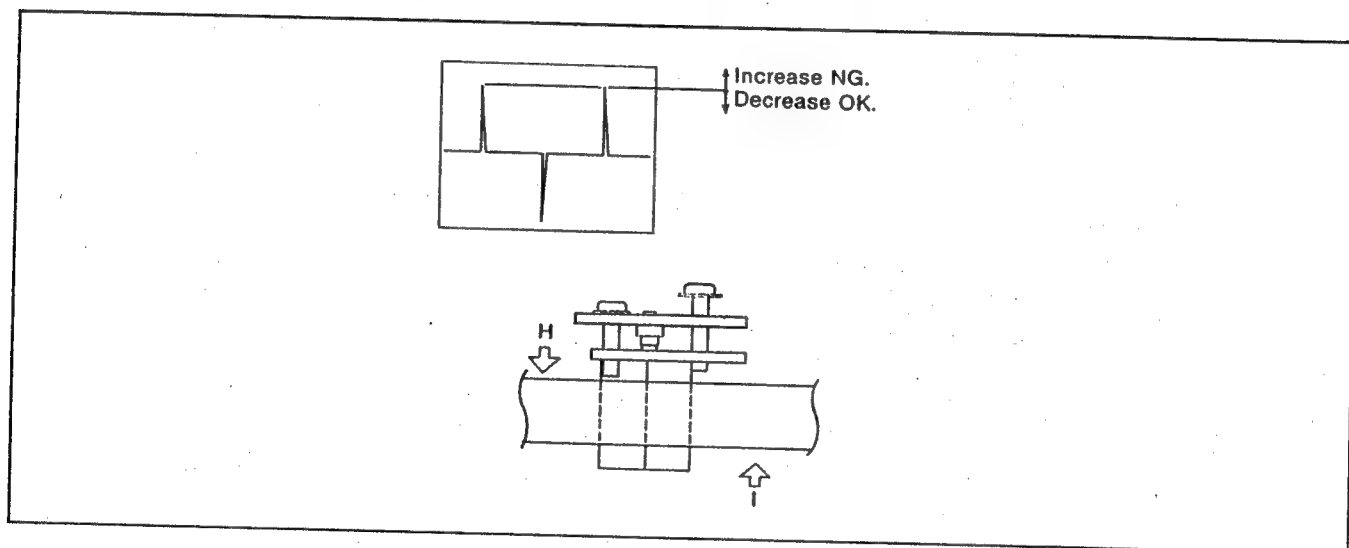


8-4-3. A/C Head Height Adjustment

SPEC	CTL Output Level is maximum
MODE	Linear Master Tape playback
TEST	TP2 on SERVO Board (CTL), TP9 (TRIG)
CONFIRM	Press tape H and I direction and confirm the audio level is decreased
TOOL	HEX Wrench M3, NUT DRIVER M4
M.EQ	Oscilloscope

<STEP 1>

1. Scope CH1 : TP2 on SERVO Board
2. Loosen screw "B" slightly.
3. Press tape gently "H" and "I" direction.
4. If the CH1 (CTL) level increase "H" direction, rotate screw "C" counterclockwise.
5. If the CH1 (CTL) level increase "I" direction, rotate screw "C" clockwise.
6. Tighten screw "B".

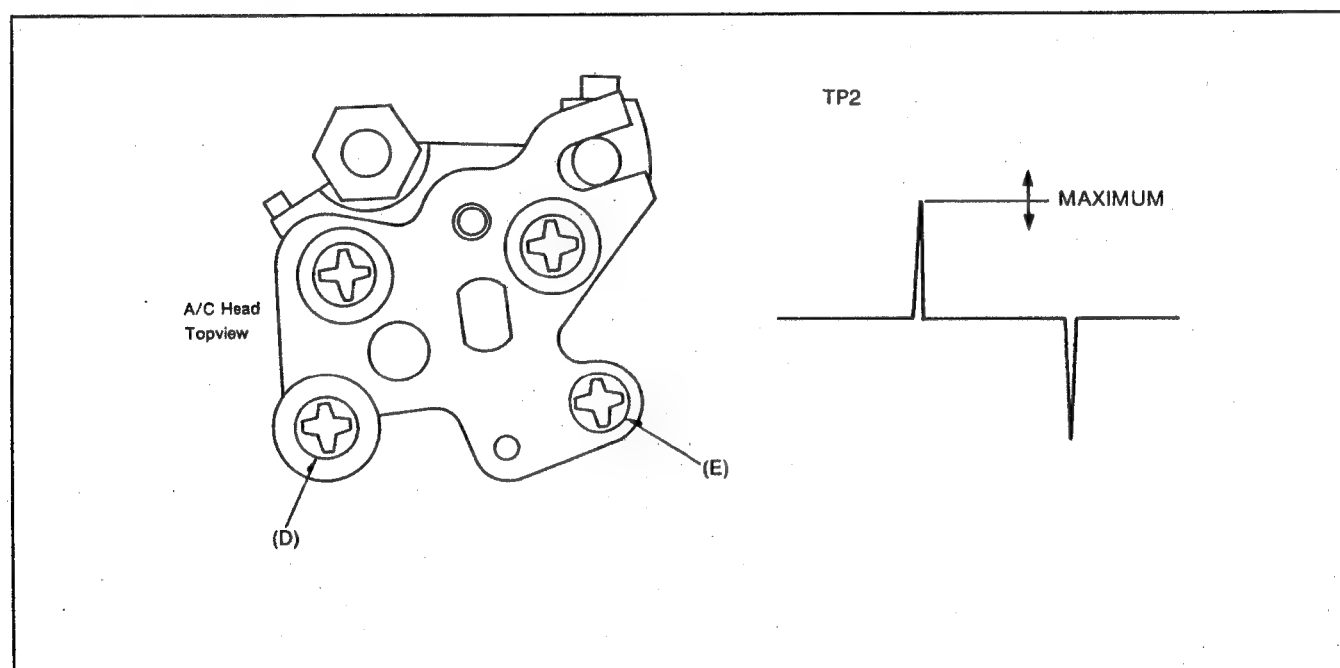


8-4-4. A/C Head Azimuth Adjustment

SPEC	CTL Output Level is maximum
MODE	Linear Master Tape Playback
TEST	TP2 on SERVO Board (CTL), TP9 (TRIG)
ADJUST	SCREW "D", SCREW "E"

<STEP 1>

1. Connect scope to TP2 on the Servo Board.
2. Loosen Screw "E" about 1/4 turn CCW.
3. Playback the Linear Master tape.
4. Adjust the screw "D" so that the CTL output level is maximum.
5. Tighten Screw "E".



8-4-5. A/C Head Horizontal Position Adjustment

SPEC	RF Envelope, CTL relationship is shown in Fig. A
	$V_2/V_{max} \geq 0.95$ (Fig. B)
TAPE	A/C Head Horizontal Position Master Tape
	Linear Master tape
MODE	PLAY mode, Tracking VR Fix
TEST	REC HEAD PB P.C.B. TP0+
	S5 SERVO TP1 (CTL)
ADJ.	A/C Head Screw "F" and "E", Hole "G"
TOOL	Eccentric Driver ($\phi 2$) VFK0358

REC RF Out
TP0+

CTL Pulse
TP1

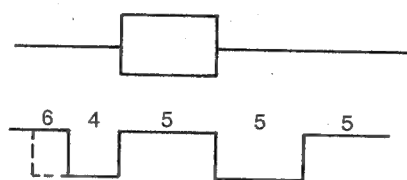


Fig.1

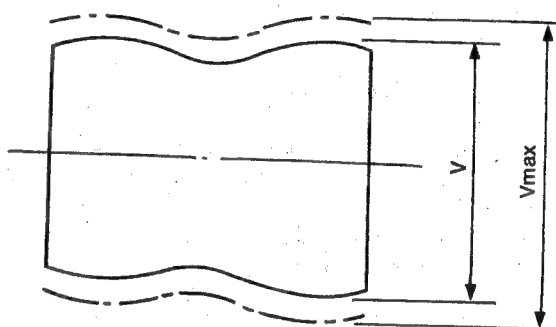
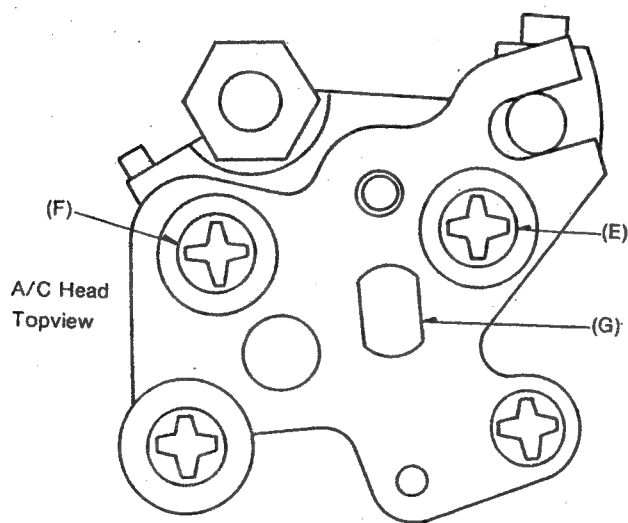


Fig.2



8-5. Electrical Adjustment Procedures

8-5-1. PG Shifter Adjustment

Board	REC HEAD PB P.C.B. JIG
T.P.	TP0+ (REC ENV CH0) EXTP65 (H.SW)
Adj.	SERVICE SET MODE SERVO / PG SHIFTER
MODE	PLAY
SIG.	LINEARITY of the Alignment Tape (No.2)
M.EQ.	Oscilloscope
Spec.	$29.21 \pm 2\mu\text{sec}$ (NTSC), $26.26 \pm 2\mu\text{sec}$ (PAL)

[Service Set Mode Operation]

1. MODE : EJECT
2. SET/OFF/DIAG SW : SET
3. Press HOLD and MENU button more than 2 seconds.

(Service set menu is displayed on the View Finder)

4. Select the "1.SERVO" by using the Shift Button.
5. Press START button.
- (SERVO menu is displayed on the View Finder.)
6. Select the "1.PG SHIFTER" by using the Shift Button.

Step 1

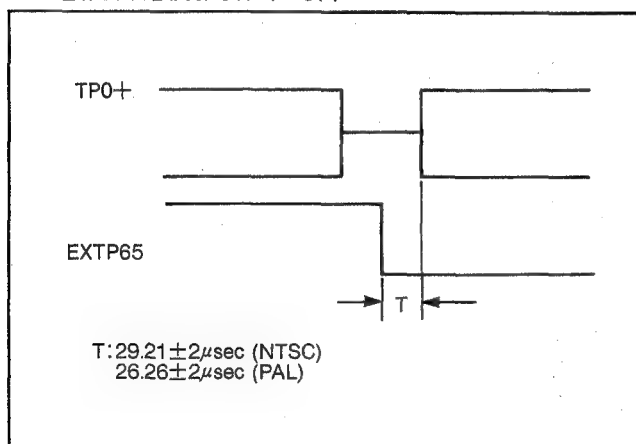
Playback the color bar portion of the alignment tape.
Press FF or REW button so that $T_2 = T_1 / 2$ (See figure).

Step 2

Press START button for memorizing the data.
Display : Flicker → Steady

Step 3

SET/OFF/DIAG SW : OFF



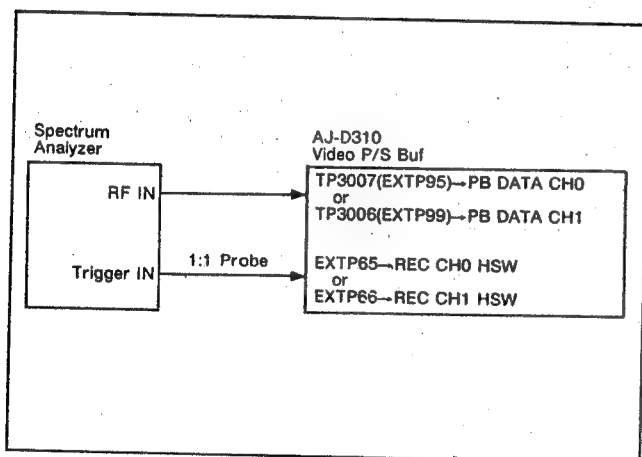
8-5-2. REC Current Adjustment

Board	Video PS BUF
T.P.	TP3007(EXTP95), TP3006(EXTP99) EXTP65, EXTP66
Adj.	SERVICE SET MODE RF ADJUST / REC CURRENT VR3005(REC F 0A), VR3006(REC F 0B), VR3003(REC F 1A), VR3004(REC F 1B)
MODE	Playback → REC
SIG.	Alignment Tape No.1 (Colour Bar) Camera Colour Bar
M.EQ.	Spectrum Analyzer AJ-D350
Spec.	-----

[Spectrum Analyzer Setting]

START : 0 Hz
 STOP : 50MHz
 RBW : 300KHz
 VBW : 1KHz
 REF LEVEL : -10.0dBm
 ATT : 10dB
 DIV : 5dB
 SWP : 300msec
 TRIG : EXT

Connect the Spectrum Analyzer as follows.



[Studio VTR Setting]

Set the Display setting as follows.

1. TEST → F2(RF)

Step 1

Playback the colour bar portion of the alignment tape by AJ-D310, and memorize this spectrum by CH B of spectrum analyzer.

Step 2

Place the unit in the Service Set Mode as follows.

1. MODE : EJECT
2. SET/OFF/DIAG SW : SET position
3. Press HOLD and MENU button more than 2 seconds.
(Service Set menu is displayed on the View Finder.)
4. Select the "2. RF ADJUST" by using a SHIFT button.
5. Press START button.
(RF ADJUST menu is displayed on the View Finder.)
6. Select the "2. REC CURRENT" by using the SHIFT button.
7. Select the CH0A or CH0B by using the ADV button.

Step 3

Set the CAM/BAR SW to the BAR mode, and place the unit in the recording mode.

Step 4

Adjust VR3005(ch0A), VR3006(ch0B) and ch0A, ch0B rec current of the Service Set so that the alignment tape spectrum and confidence playback spectrum become same spectrum.

Note: Rec Current of the service set

FF : Increase

REW : decrease

After setting the ch0A, press the START button for memorizing the setting data and then go to ch0B.

Step 5

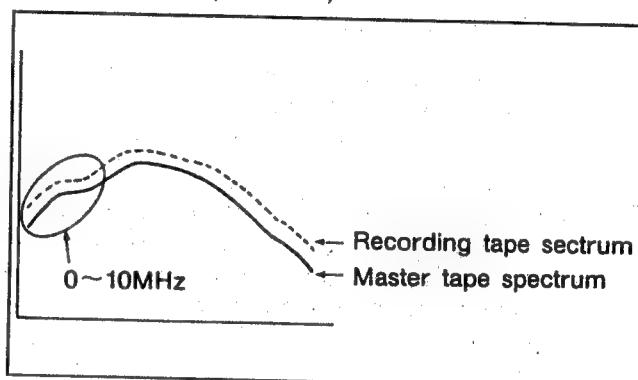
Perform the same adjustment step 1 to step 4 for the ch1A and ch1B.

T.P. : TP3006(EXTP99) PB DATA CH1

EXTP66 for trigger

Adj. : VR3003(REC F 1A)

VR3004(REC F 1B)



Step 6

Playback the colour bar portion of the alignment tape (No.1) and note the error rate of inner and total.

Record the colour bar a few second by AJ-D310 and playback this portion by AJ-D350.

Confirm the error rate as follows.

Total Error : Less than Alignment error + 1

Inner Error : Less than Alignment error +0.5

Step 7

If it is not, repeat step 1 - 6

8-5-3. Equalizer Adjustment

Board	Equalizer
T.P.	EXTP23,TP1,TPG2 TP101,TPG102
Adj.	VR1/101[P.SHIFT], VR2/102[FIX FREQ] VR3/103[MAG A], VR4/104[MAG B] VR5/105[COMP BIAS LVL] C10/116[RESON A], C11/117[RESON B]
Mode	REC → PLAY
Sig.	Camera Colorbar
M.EQ.	Oscilloscope, AJ-PB30
Spec.	Error Rate = -2.5

Step 1

1. Turn the SW1 and SW101 on the Equalizer P.C.Board to on. (Install the jumper sw.)
2. Extend the Equalizer P.C.Board by extender board (VFK0688).
3. Turn the SW3002 No.1-6 of PB 2 P.C.Board in the Playback Adaptor(AJ-PB30) to off.
4. Connect the Playback Adaptor (AJ-PB30).

Step 2

Set the shuffling sw to off position.

1. Mode : EJECT or STOP
2. SET/OFF/DIAG SW : DIAG position.
3. Press HOLD and MENU button more than 2 seconds. (Maker Mode menu is displayed on the View Finder.)
4. Select the "1. REC MEMORY" by using a SHIFT button.
5. Press the START button. (REC MEMORY menu is displayed on the View Finder.)
6. Set each item as follows.

(Factory Set)

1. M.SEQUENCE : ON (ON)
2. INTRA SHUFFLE : OFF (ON)
3. FIELD SHUFFLE : OFF (ON)
4. ERROR RATE : OFF (ON)

(SHIFT button → Select the item
ADV button → ON ↔ OFF)

7. SET/OFF/DIAG SW : OFF position.

Note : Rec Memory data is returned to the factory setting, when turn the power sw to off.

Step 3

Confirmation of PB Adjust data.

1. Mode : EJECT
2. SET/OFF/DIAG SW : SET position
3. Press HOLD and MENU button more than 2 seconds. (Service set menu is displayed on the View Finder.)
4. Select the "5.PB ADJUST" by using a SHIFT button.
5. Press START button. (PB ADJUST menu is displayed on the View Finder.)
6. Select the "1.EQ FREQ" by using a SHIFT button.
7. Confirm the data of each head are "C0".
8. Select the "2.EQ GAIN" by using a SHIFT button.
9. Confirm the data of each head are "C0".
10. If they are not, select the Head by using the ADV button and adjust the data to "C0" by using the FF or REW button.
(FF=Up, REW=Down, HOLD+FF=Up for second Digit
START=Memorizing the data)

Step 4

Setup the error rate menu

1. SW3003-1 : ON
(on the PB2 P.C.Board of the AJ-PB30)
2. SET/OFF/DIAG SW : DIAG
3. Press MENU button.
(Diagnostic menu is displayed on the View Finder.)
4. Select the "6.ERROR RATE" by using the SHIFT button.
5. Press START button.
(ERROR RATE is displayed on the View Finder.)

Note : In the error rate display mode, output signal from AJ-PB30 can be selected by RESET button.
(Normal picture→ CH0 picture→ CH1 picture)

Step 5

1. Set the CAM/BAR sw to BAR position.
2. Record the Camera color bar for a few minutes.
3. Playback the recording portion and adjust the following VRs so that the digital error on the playback picture is minimized.

ch0 Head	ch1 Head	VR Name
VR1	VR101	[PHASE SHIFT]
VR5	VR105	[COMP BIAS LVL]
VR2	VR102	[FIX FREQ]
C10	C116	[RESON A]
C11	C117	[RESON B]

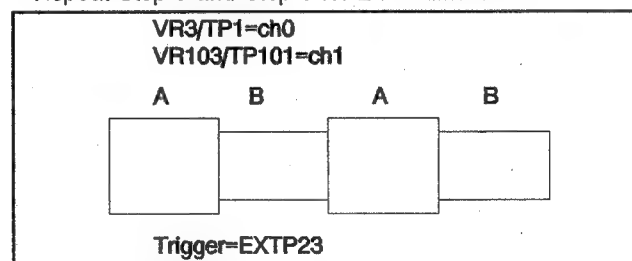
Step 6

Scope CH1 : TP1/ch0, TP101/ch1

Scope CH2 : EXTP23 (Trigger)

Adjust VR3/ch0, VR103/ch1[MAG A] and VR4/ch0, VR104/ch1[MAG B] so that the RF signal of ch0A and ch0B become same and maximum level. Digital error on the playback picture is minimized as shown figure.

Repeat Step 5 and Step 6 for a few times.



Step 7

Confirm the error rate.

1. Select the "3.VIDEO ch0A ch0B" and "4.VIDEO ch1A ch1B" in the Error Rate menu of the Diagnostic menu.
2. Confirm the each error rate less than **-2.5**.
3. If it is not, readjust Step 5 to Step 7 or Rec Current adjustment or Mechanical adjustment.

Step 8

Final confirmation

1. Set the shuffling sw to on. (Refer to Step 2)
2. Set the SW3002 No.1-6 to on position on the PB2 P.C.Board of the Playback Adaptor(AJ-PB30).
3. Record the camera colorbar for a few minutes, and playback this portion.
4. Confirm the playback picture on the monitor is no error.

Step 9

Remove the jumper sw from the SW1 and SW101 on the Equalizer P.C.Board.

Service Manual

*Electrical
Adjustments*

Electrical Adjustment

Panasonic
Broadcast Systems

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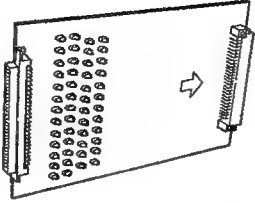
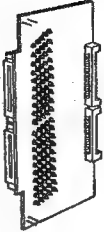
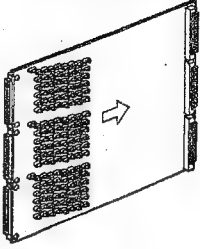
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Usage of Extender Board

AJ-D320 has three kind of Extender Board.

Extender	VFK0814	VFK0863	VFK0804
P.C.Board			
Rec Power	✓		
PB Power	✓		
Video A/D PLL		✓	
Rec Memory		✓	
Video P/S Buffer		✓	
Equalizer		✓	
Audio Rec		✓	
Audio A/D		✓	
System control		✓	
Servo 1		✓	
Servo 2		✓	
Play Back 0			✓
Play Back 1			✓
Play Back 2			✓

NTSC Electrical Adjustment Procedures

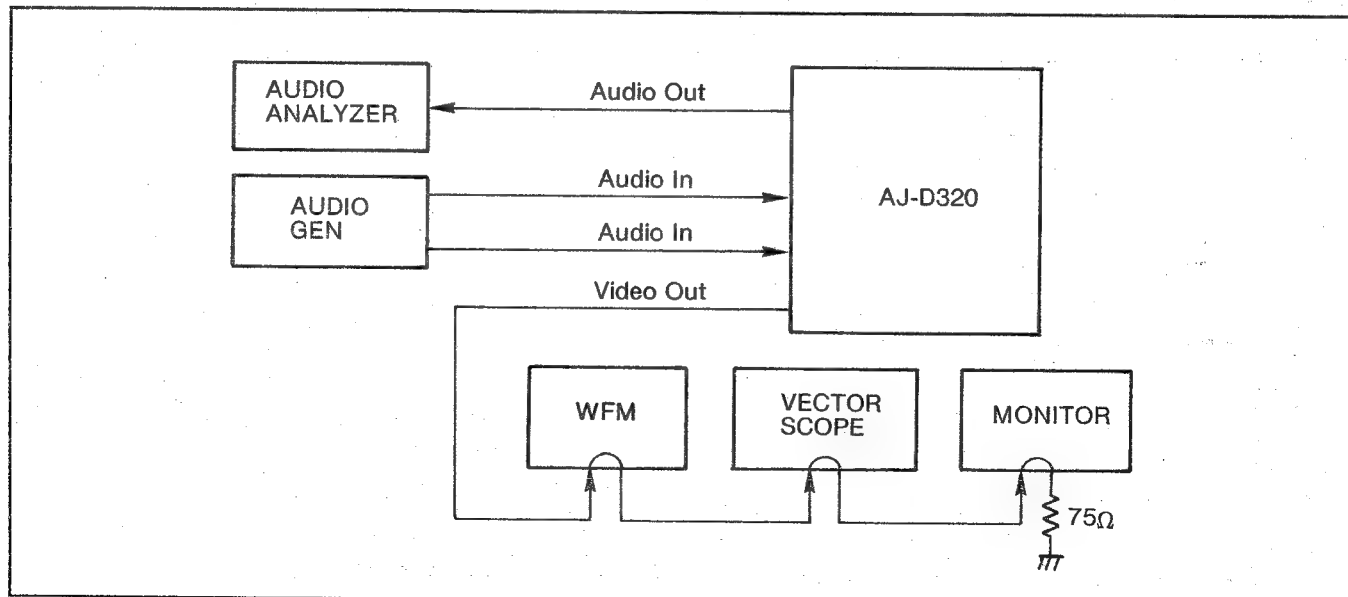
Recommended Test and Measuring Equipments

The following test and measuring equipments are required to conduct the electrical adjustments.

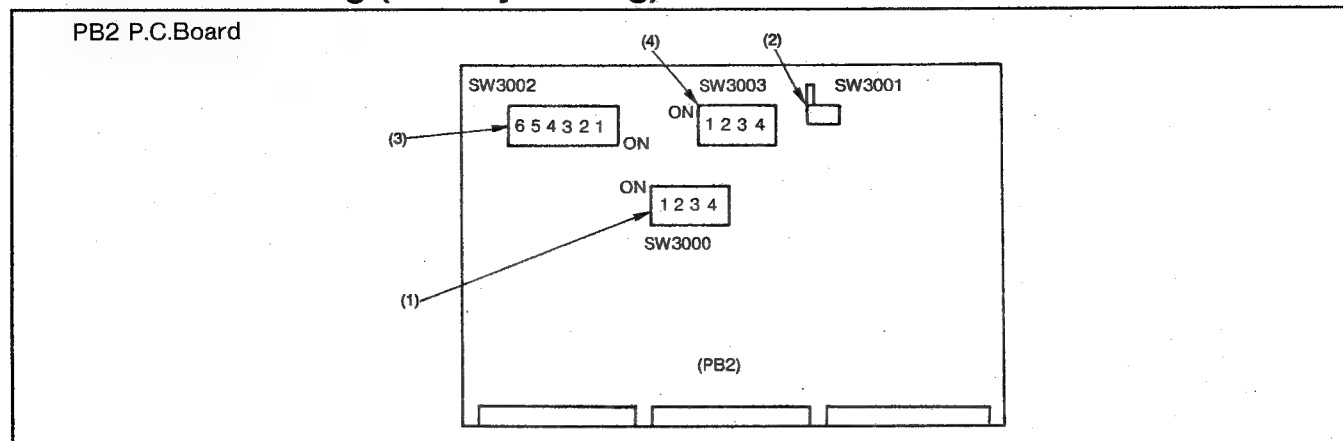
Model No. or Equivalent	Equipment	Remark
2467B TEKTRONIX	Dual Trace Oscilloscope	More than 400MHz
1485R TEKTRONIX	Wave Form Monitor	
520A TEKTRONIX	Vector Scope	
1750 TEKTRONIX	SCH Meter	
1910 TEKTRONIX	Digital Signal Generator	
HP8591A HEWLETT PAKARD	Spectrum Analyzer	
	Digital Volt Meter (D.V.M.)	
	Frequency Counter	
	Audio Level Meter	
	DC Power Supply	12VDC More than 5A

Preparation of Adjustment

1. CONNECTION



Initial Switch Setting (Factory Setting)



	SW No.	SW Name	Description	Factory Setting
(1)	SW3000-1	Audio CH Sel BPN	ON : Adapter OFF : Portable	ON
	SW3000-2	Audio 16/18 Sel	ON : 18bit OFF : 16bit	OFF
	SW3000-3	Audio Output Sel	ON : E-E OFF : PB	OFF
	SW3000-4	Audio Playback	ON : Audio CH3,4 playback OFF : Audio CH1,2 playback	OFF
(2)	SW3001	E-E Mode Select	Left : E-E Force mode Right : Full E-E mode	Left
(3)	SW3002-1	Video Mute	ON : When a state in which may errors have occurred continues for 10 or more seconds, the video signals are muted. OFF : No muting	ON
	SW3002-2	Inner ECC	ON : Correction of Inner ECC OFF : No correction	ON
	SW3002-3	Video Outer ECC	ON : Correction of Video Outer ECC OFF : No correction	ON
	SW3002-4	Video Conceal	ON : Concealment of Video OFF : No concealment	ON
	SW3002-5	Audio Outer ECC	ON : Correction of Audio Outer ECC OFF : No correction	ON
	SW3002-6	Audio Interporation	ON : Concealment of Audio OFF : No concealment	ON
(4)	SW3003-1	Error Rate	ON : Error rate is displayed OFF : No display	OFF
	SW3003-2	Tape SW	ON : No muting in FF/REW mode OFF : Muting in FF/REW mode	ON
	SW3003-3	Not used	-----	OFF
	SW3003-4	For factory use	-----	OFF

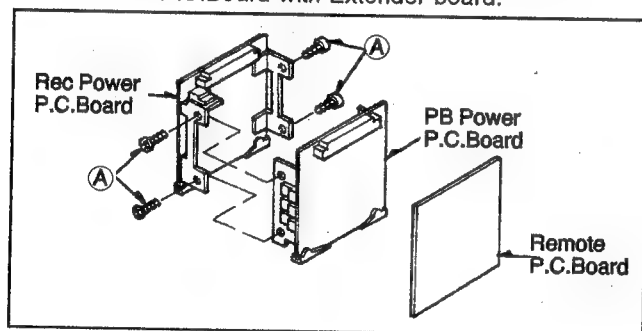
1. Power Supply Section

1-1. Rec Power Adjustment

Board	Rec Power
T.P.	9A(+5V), 11A(-5V), 13A(+9V), 14A(-9V), 18A(+16V), 16A(-2V)
Adj.	VR1001(+5V), VR1002(-5V), VR1003(+9V), VR1004(-9V), VR1005(+16V), VR1006(-2V)
Input	Color bar
Tape	Blank Tape
Mode	REC PLAY
M.EQ.	D.V.M.
Spec.	DC +5V($\pm 0.03V$), DC -5V($\pm 0.03V$), DC +9V($\pm 0.03V$), DC -9V($\pm 0.03V$), DC +16V($\pm 0.03V$), DC -2V($\pm 0.015V$)

Note :

- (1) Remove the Power unit from the deck.
- (2) Unscrew the 4 screws (A) and separate the Rec Power P.C.Board and PB Power P.C.Board.
- (3) Reinstall the PB Power P.C.Board and extend the Rec Power P.C.Board with Extender board.

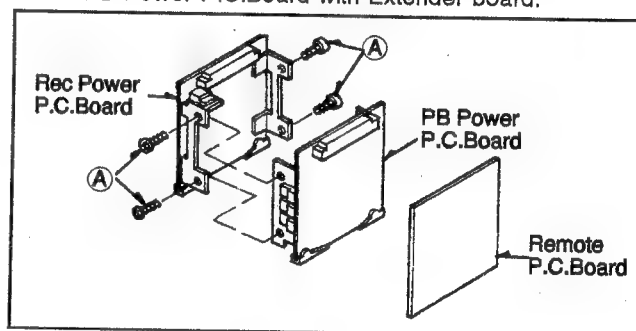


1-2. PB Power Adjustment

Board	Rec Power
T.P.	8B(+5V), 9B(-5V), 10B(+9V), 10A(-9V), 12B(-2V)
Adj.	VR1001(+5V), VR1002(-5V), VR1003(+9V), VR1004(-9V), VR1005(-2V)
Input	-----
Tape	Self Recording Tape or Alignment Tape
Mode	PLAY
M.EQ.	D.V.M.
Spec.	DC +5V($\pm 0.03V$), DC -5V($\pm 0.03V$), DC +9V($\pm 0.03V$), DC -9V($\pm 0.03V$), DC -2V($\pm 0.015V$)

Note :

- (1) Remove the Power unit from the deck.
- (2) Unscrew the 4 screws (A) and separate the REC Power P.C.Board and PB Power P.C.Board.
- (3) Reinstall the REC Power P.C.Board and extend the PB Power P.C.Board with Extender board.



2. SERVO SECTION

2-1. T-S OFF SET Voltage Adjustment

Board	Servo 1
T.P.	TP2005
Adj.	VR2001
Input	-----
Tape	-----
Mode	Eject
M.EQ.	D.V.M.
Spec.	2400mV(± 10 mV)

2-2. T-S Gain Adjustment

Board	Servo 1
T.P.	TP2005
Adj.	VR2003
Input	-----
Tape	Cassette Shell only *1
MODE	Stop
M.EQ.	D.V.M.
Spec.	1800mV(± 100 mV)

*1 Make a tape removed cassette shell, and use for this adjustment.

Step 1

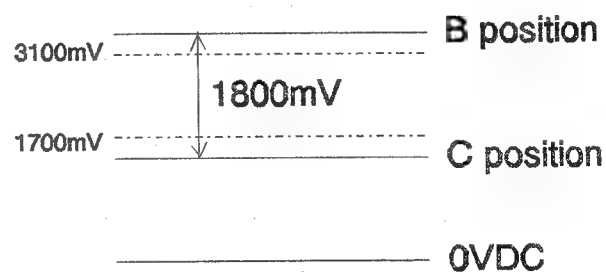
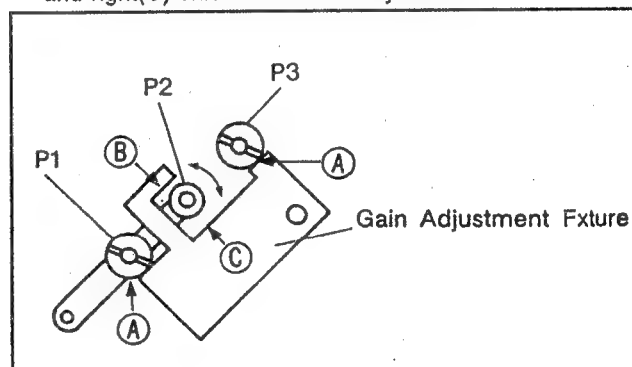
Scope CH1 : TP2005 1V/D 10 μ s/D

Step 2

Set the Gain Adjustment Fixture as shown figure. It should be touched to P1 and P3 post. (A portion)

Step 3

Adjust VR2003 so that the measurement range is 1800mV ± 100 mV when P2 post is moved between left(B) and right(C) side of the fixture by hand.



2-3. PG Shifter Adjustment

Board	Servo 1
T.P.	VIDEO PS BUFF TP3007 SERVO 1 TP2011 (Trigger)
Adj.	SERVICE SET MODE SERVO / PG SHIFTER
Input	Color Bar of the Alignment Tape (No.1)
Tape	-----
Mode	PLAY
M.EQ.	Oscilloscope
Spec.	$T_2 = T_1 / 2$ ($\pm 2\mu\text{S}$)

[Service Set Mode Operation]

1. MODE : STOP/EJECT
2. SET/OFF/DIAG SW : SET
3. Press HOLD and MENU button more than 2 seconds.
Service set menu is displayed on the Monitor.
(Video Out 2 / TC Super switch on the Sub Panel to ON.)
4. Select the "1.SERVO" by using the Shift Button.
5. Press START button.
(SERVO menu is displayed on the Monitor.)
6. Select the "1.PG SHIFTER" by using the Shift Button.

Step 1

Playback the color bar portion of the alignment tape.

Press FF or REW button so that $T_2 = T_1 / 2$ (See figure).

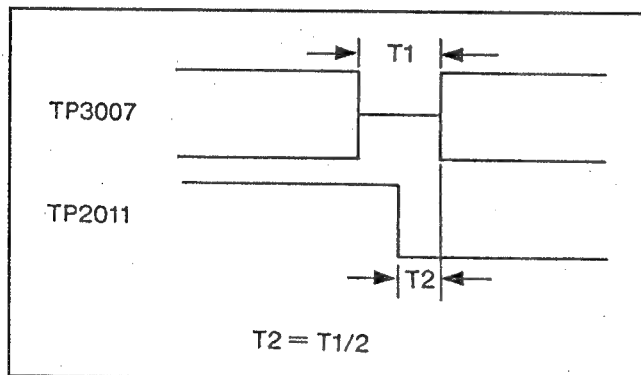
Step 2

Press START button for memorizing the data.

Display : Flicker \rightarrow Steady

Step 3

SET/OFF/DIAG SW : OFF



3. Video PS BUFFER Section 1

3-1. OFF SET Adjustment

Board	Video PS BUF
T.P.	TP3005[RL 0], TP3004[RL 1]
Adj.	VR3002(OFF SET 0), VR3001(OFF SET 1)
Input	-----
Tape	-----
MODE	EJECT
M.EQ.	-----
Spec.	DC 0V ($\pm 100\text{mV}$)

Step 1

Adjust VR3002 so that the TP3005 (RL 0) level is 0V.

Step 2

Adjust VR3001 so that the TP3004 (RL 1) level is 0V.

4. Equalizer Section

4-1 Equalizer Adjustment

Board	Equalizer
T.P.	EXTP23, TP1, TPG2 TP101, TPG102
Adj.	VR1/101[P.SHIFT], VR2/102[FIX FREQ] VR3/103[MAG A], VR4/104[MAG B] VR5/105[COMP BIAS LVL] C10/116[RESON A], C11/117[RESON B]
Input	-----
Tape	Alignment Tape No.2 (Color Bar portion)
Mode	PLAY
M.EQ.	Oscilloscope
Spec.	Error Rate = See figure

Step 1

1. Turn the SW1 and SW101 on the Equalizer P.C.Board to on. (Install the jumper sw.)
2. Extend the Equalizer P.C.Board by extender board (VFK0688).
3. Turn the SW3002 No.1-6 on the PB 2 P.C.Board to off.

Step 2

Set the shuffling sw to off position.

1. Mode : EJECT or STOP
2. SET/OFF/DIAG SW : DIAG position.
3. Press HOLD and MENU button more than 2 seconds. (Maker Mode menu is displayed on the Monitor.)
4. Select the "1. REC MEMORY" by using a SHIFT button.
5. Press the START button. (REC MEMORY menu is displayed on the Monitor.)
6. Set each item as follows.

(Factory Set)

1. M.SEQUENCE : ON(ON)
2. INTRA SHUFFLE : OFF(ON)
3. FIELD SHUFFLE : OFF(ON)
4. ERROR RATE : OFF(ON)

(SHIFT button → Select the item
ADV button → ON ↔ OFF)

7. SET/OFF/DIAG SW : OFF position.

Note : Rec Memory data is returned to the factory setting, when turn the power sw to off.

Step 3

Confirmation of PB Adjust data.

1. Mode : EJECT
2. SET/OFF/DIAG SW : SET position
3. Press HOLD and MENU button more than 2 seconds. (Service set menu is displayed on the Monitor.)
4. Select the "5.PB ADJUST" by using a SHIFT button.
5. Press START button. (PB ADJUST menu is displayed on the Monitor.)
6. Select the "1.EQ FREQ" by using a SHIFT button.
7. Confirm the data of each head are "C0".
8. Select the "2.EQ GAIN" by using a SHIFT button.
9. Confirm the data of each head are "C0".
10. If they are not, select the Head by using the ADV button and adjust the data to "C0" by using the FF or REW button. (FF=Up, REW=Down, HOLD+FF=Up for second Digit START=Memorizing the data)

Step 4

Setup the error rate menu

1. SW3003-1 : ON
(on the PB2 P.C.Board)
2. SET/OFF/DIAG SW : DIAG
3. Press MENU button.
(Diagnostic menu is displayed on the Monitor.)
4. Select the "6.ERROR RATE" by using the SHIFT button.
5. Press START button.
(ERROR RATE is displayed on the Monitor.)

Note : In the Service Set mode, output signal (Video Out 2) can be selected by RESET button.
(Normal picture → CH0 picture → CH1 picture)

Step 5

1. Playback the Color bar portion of the Alignment tape and adjust the following VRs so that the digital error on the playback picture is minimized.

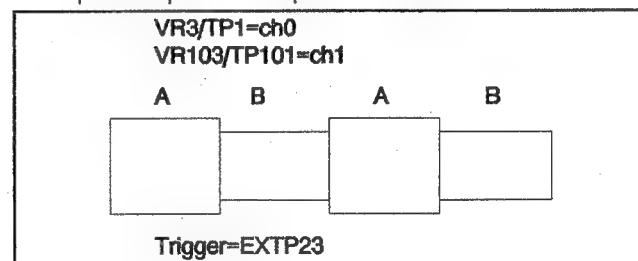
ch0 Head	ch1 Head	VR Name
VR1	VR101	[PHASE SHIFT]
VR5	VR105	[COMP BIAS LVL]
VR2	VR102	[FIX FREQ]
C10	C116	[RESON A]
C11	C117	[RESON B]

Step 6

Scope CH1 : TP1/ch0, TP101/ch1

Scope CH2 : EXTP23 (Trigger)

Adjust VR3/ch0, VR103/ch1[MAG A] and VR4/ch0, VR104/ch1[MAG B] so that the RF signal of ch0A and ch0B become same and maximum level. Digital error on the playback picture is minimized as shown figure.
Repeat Step 5 and Step 6 for a few times.



Step 7

Confirm the error rate.

2. Confirm the each error rate as follows.

Video Total	Audio Total	ch0A	ch0B	ch1A	ch1B
-4.5<	-4.0<	-4.0<	-4.0<	-4.0<	-4.0<

3. If it is not, readjust Step 5 to Step 7 or Rec Current adjustment or Mechanical adjustment.

Step 8

Final confirmation

1. Set the shuffling sw to on. (Refer to Step 2)
2. Set the SW3002 No.1-6 to on position on the PB2 P.C.Board.
3. Playback the Alignment Tape No2.
4. Confirm the playback picture on the monitor is no error.

Step 9

Remove the jumper sw from the SW1 and SW101 on the Equalizer P.C.Board.

5. Video PS Buffer Section 2

5-1. Duty Adjustment

Board	Video PS BUF
T.P.	TP3012, TP3010
Adj.	SERVICE SET MODE RF ADJUST / DUTY ADJUST TEST
Input	Color Bar
Tape	Blank Tape
MODE	EJECT → REC
M.EQ.	Oscilloscope
Spec.	A / B = 50 / 50

[Service Set Mode Operation]

1. MODE : EJECT / STOP
2. SET/OFF/DIAG SW : SET position
3. Press HOLD and MENU button more than 2 seconds.
(Service Set menu is displayed on the Monitor.)
4. Select the "2.RF ADJUST" by using a SHIFT button.
5. Press START button.
(RF ADJUST menu is displayed on the Monitor.)
6. Select the "4.DUTY ADJUST TEST" by using the SHIFT button.

[Duty (CH 0A · 0B) Adjustment]

Step 1

Scope CH1 : TP3012 500mV/D, 10μs/D

Step 2

Select the CH0A by using the ADV button on the Monitor.

Step 3

Place the unit in the Recording mode.

Step 4

Press the FF or REW button so that the Duty is 50% as shown figure. After adjustment, press the START button for memorizing the adjustment data.

Step 5

Select the CH0B by using the ADV button, and perform the same adjustment Step 4.

[Duty (CH 1A · 1B) Adjustment]

Step 1

Scope CH1 : TP3010 500mV/D, 10μs/D

Step 2

Select the CH1A by using the ADV button on the Monitor.

Step 3

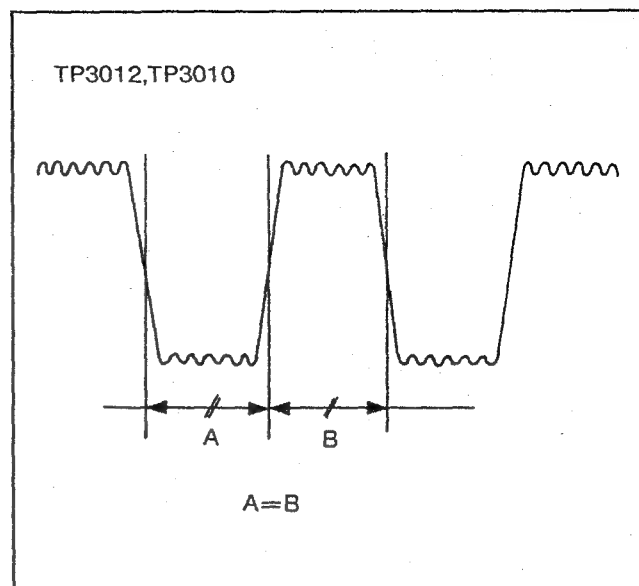
Place the unit in the Recording mode.

Step 4

Press the FF or REW button so that the Duty is 50% as shown figure. After adjustment, press the START button for memorizing the Adjustment data.

Step 5

Select the CH1B by using the ADV button, and perform the same adjustment Step 4.



NTSC

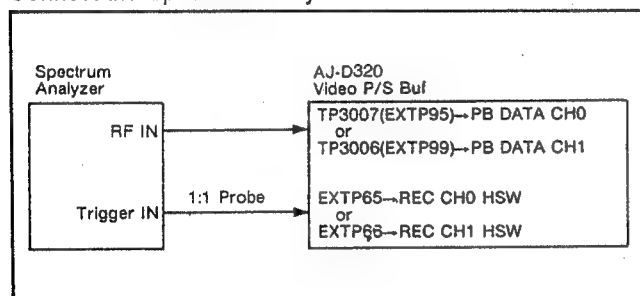
5-2. REC Current Adjustment

Board	Video PS BUF
T.P.	TP3007(EXTP95), TP3006(EXTP99) EXTP65, EXTP66
Adj.	SERVICE SET MODE RF ADJUST / REC CURRENT VR3005(REC F 0A), VR3006(REC F 0B), VR3003(REC F 1A), VR3004(REC F 1B)
Input	Color Bar
Tape	Alignment Tape No.1 (Color Bar portion)
MODE	Playback → REC
M.EQ.	Spectrum Analyzer
Spec.	-----

[Spectrum Analyzer Setting]

START : 0 Hz
 STOP : 50MHz
 RBW : 300KHz
 VBW : 1KHz
 REF LEVEL : -10.0dBm
 ATT : 10dB
 DIV : 5dB
 SWP : 300msec
 TRIG : EXT

Connect the Spectrum Analyzer as follows.



Step 1

Playback the color bar portion of the alignment tape No.2 and memorize this spectrum by CH B of spectrum analyzer.

Step 2

Place the unit in the Service Set Mode as follows.

1. MODE : EJECT
2. SET/OFF/DIAG SW : SET position
3. Press HOLD and MENU button more than 2 seconds.
(Service Set menu is displayed on the Monitor.)
4. Select the "2. RF ADJUST" by using a SHIFT button.
5. Press START button.
(RF ADJUST menu is displayed on the Monitor.)
6. Select the "2. REC CURRENT" by using the SHIFT button.
7. Select the CH0A or CH0B by using the ADV button.

Step 3

Place the unit in the recording mode.

Step 4

Adjust VR3005(ch0A), VR3006(ch0B) and ch0A, ch0B rec current of the Service Set so that the alignment tape spectrum and confidence playback spectrum become same spectrum.

Note : Rec Current of the service set

FF : Increase

REW : decrease

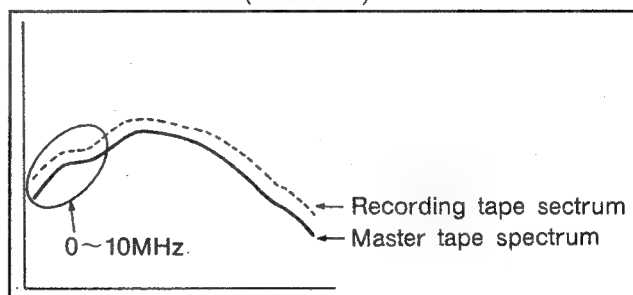
After setting the ch0A, press the START button for memorizing the setting data and then go to ch0B.

Step 5

Perform the same adjustment step 1 to step 4 for the ch1A and ch1B.

T.P. : TP3006(EXTP99) PB DATA CH1
EXTP66 for trigger

Adj. : VR3003(REC F 1A)
VR3004(REC F 1B)



Step 6

Confirm the error of the confidence playback picture.

If the error is appeared on the picture, readjust the all VRs and setting until error is minimized on the picture.

(Shuffling = off / refer to Equalizer adjustment)

(SW3002 No.1-6 / PB2 P.C.Board = off)

Step 7

Record the color bar signal for a few seconds and playback this portion.

Confirm the error rate as follows.

Video Total	Audio Total	ch0A	ch0B	ch1A	ch1B
-4.5<	-4.0<	-4.0<	-4.0<	-4.0<	-4.0<

If it is not, repeat step 1 - 7.

6. VIDEO A/D PLL Section

6-1. APC OFF SET DC Adjustment

Board	Video A/D PLL
T.P.	TP3207
Adj.	VR3202
Input	Color Bar
Tape	-----
Mode	Eject
M.EQ.	Oscilloscope
Spec.	DC 2.7V (+0V/-0.1V)

Step 1

Scope CH1 : TP3207 500mV/D, 10 μ s/D

Step 2

Adjust VR3202 so that DC voltage is 2.7V(+0V/-0.1V).

6-2. Reference Clock Adjustment

Board	Video A/D PLL
T.P.	TP3212
Adj.	VC3201
Input	Color Bar
Tape	-----
Mode	Eject
M.EQ.	Frequency Counter
Spec.	14.31818MHz (\pm 100Hz)

Step 1

Freq. Counter : TP3212

Step 2

Adjust VC3201 so that the Reference Clock is 14.31818MHz (\pm 100Hz).

6-3. A/D Input Level Adjustment

Board	Video A/D PLL
T.P.	TP3101, Video Out 1
Adj.	VR3101(AGC 0 LVL), VR3102(CLAMP DC) VR3103(AGC LVL)
Input	Color Bar
Tape	-----
Mode	Eject
M.EQ.	Oscilloscope / W.F.M.
Spec.	-----

Step 1

Scope CH1 : TP3101 100mV/D, 10μs/D

Step 2

Adjust VR3101 so that the (A) portion is 420mV (±10mV).

Step 3

W.F.M. : Video Out 1

Step 4

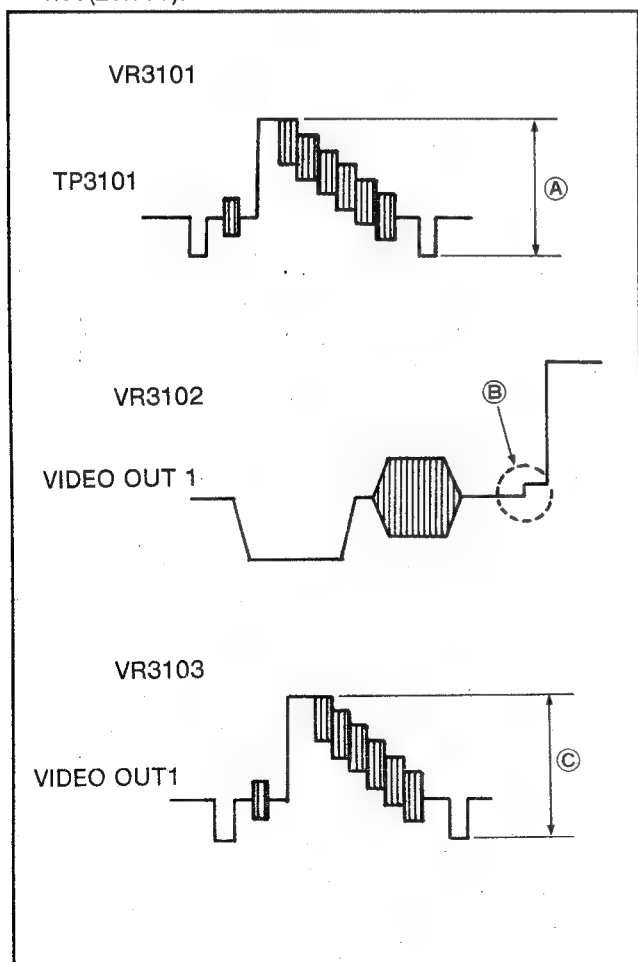
Place the unit in the Full E-E mode.
(Keep on pressing the REC Button or set the SW1 on the PB2 P.C.Board to Full E-E position.)

Step 5

Adjust VR3102 so that the (B) portion becomes flat.

Step 6

Adjust VR3103 so that the Video Out Level (C) is 1.0V(±0.01V).



6-4. Video Phase Adjustment 1

Board	Video A/D PLL
T.P.	TP3103, EXTP12, TP3211, TP3209
Adj.	VR3201 (H PHASE)
Input	Color Bar
Tape	-----
Mode	Eject
M.EQ.	Oscilloscope
Spec.	-----

Step 1

Scope CH1 : TP3103

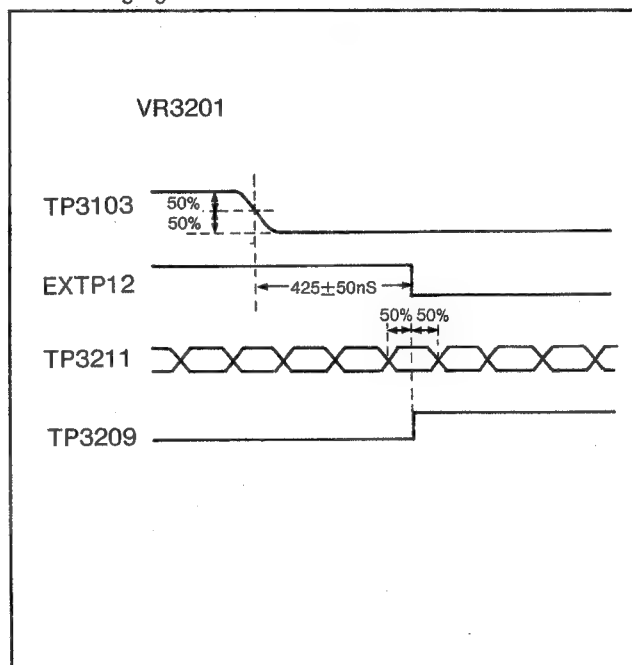
Scope CH2 : EXTP12

Scope CH3 : TP3211

Scope CH4 : TP3209

Step 2

Adjust VR3201 so that the each signals phase become as following figure.



6-5. Video Phase Adjustment 2

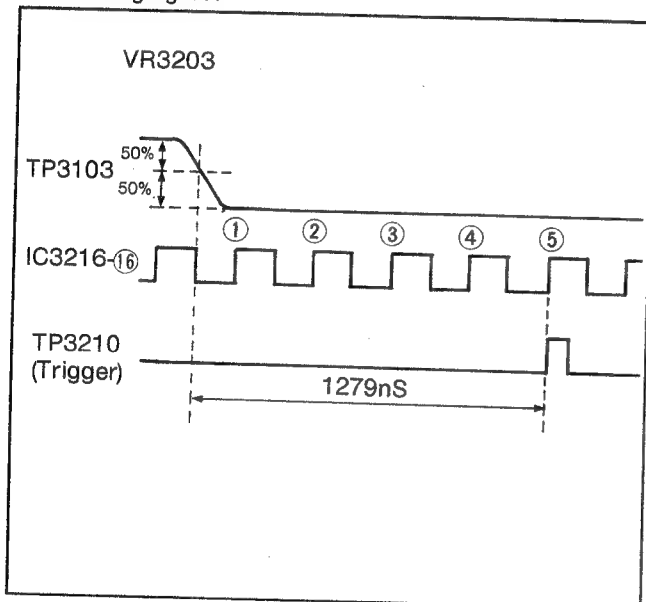
Board	Video A/D PLL
T.P.	TP3103, IC3216 Pin16, TP3210
Adj.	VR3203(SCH ADJ)
Input	Color Bar
Tape	-----
Mode	Eject
M.EQ.	Oscilloscope
Spec.	-----

Step 1

Scope CH1 : TP3103
 Scope CH2 : IC3216 pin16
 Scope CH3 : TP3210

Step 2

Adjust VR3203 so that the each signal phase become as following figure.



7. Video NSTD Section

7-1. AFC BF Position Adjustment

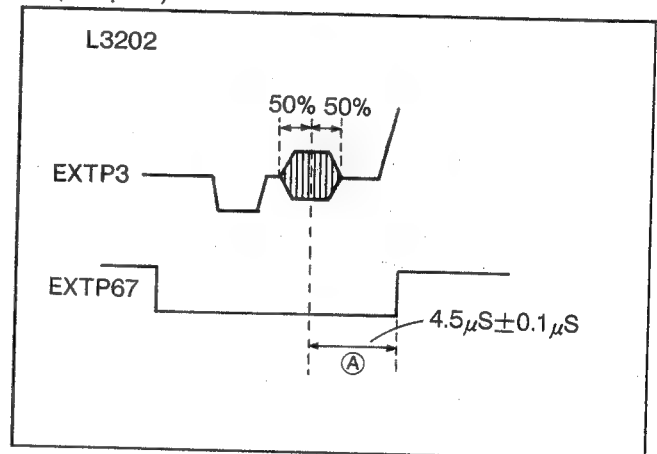
Board	Video NSTD
T.P.	EXTP3, EXTP67
Adj.	L3202
Input	Color Bar
Tape	-----
Mode	Eject
M.EQ.	Oscilloscope
Spec.	A=4.5 μ s (\pm 0.1 μ s)

Step 1

Scope CH1 : EXTP3
 Scope CH2 : EXTP67

Step 2

Adjust L3202 so that the (A) portion is 4.5 μ sec (\pm 0.1 μ sec).



7-2. NSTD Chroma Phase Adjustment

Board	Video NSTD
T.P.	Video Out 1
Adj.	VR3301, VR3302
Input	Color Bar
Tape	-----
Mode	Eject (Full E-E mode)
M.EQ.	Vectorscope
Spec.	-----

Step 1

Vectorscope : Video Out 1

Step 2

Place the unit in the full E-E mode.

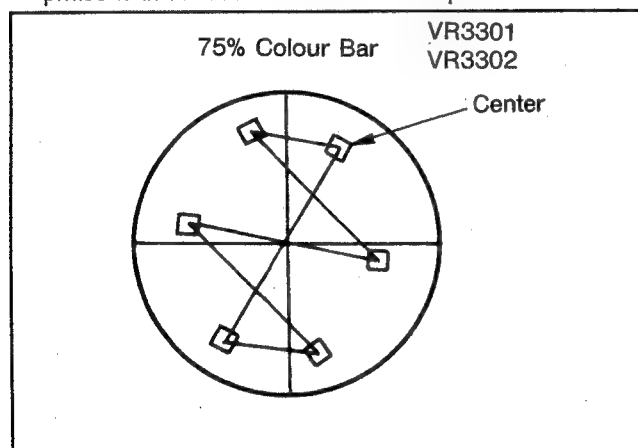
(Keep on pressing the REC button or set SW1 on the PB2 P.C.Board to on position.)

Step 3

Set the SW3201 on the Video A/D PLL P.C.Board to TEST side.

Step 4

Adjust VR3301 and VR3302 so that the each chroma phase is in the inner box of vectorscope.



8. PlayBack 0 Section

Note : When adjusting either CH0 or CH1 side, display picture of a channel on the monitor which you want to adjust.

Operating instruction to display either CH0 or CH1 picture is as follows.

1. Set SET/OFF/DIAG SW to DIAG position .
2. Press <MENU> button.
3. Press <RESET> button so that playback picture from Video Out 1 is changed as follows.

NORMAL → CH0 → CH1

8-1. PLL Lock Voltage Adjustment

Board	PB 0
T.P.	TP6, TP8 for CH0 / TP5, TP7 for CH1
Adj.	VR2, VR5, VR6 for CH0 VR1, VR3, VR4 for CH1
Input	-----
Tape	Alignment Tape No.2 (Color Bar portion)
Mode	Playback (Shuffling OFF mode)
M.EQ.	Oscilloscope
Spec.	PLL pull in range $\pm 300\text{mV}$ MIN

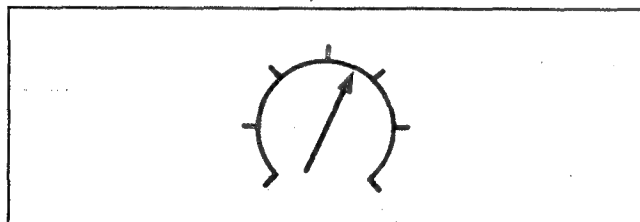
<For CH1 playback>

Step 1

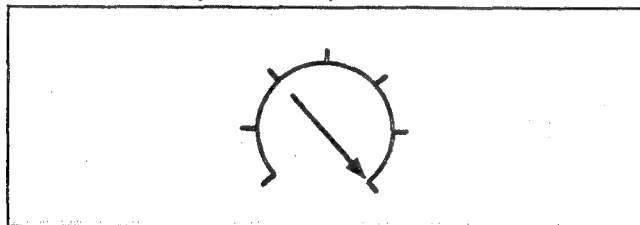
1. Scope CH1 : TP5
Scope CH2 : TP7
2. Set Oscilloscope GND level of CH1 and CH2 are the same level.

Step 2

1. Playback the color bar portion of the Alignment Tape No.2.
2. Set VR2 to 1 o'clock position.

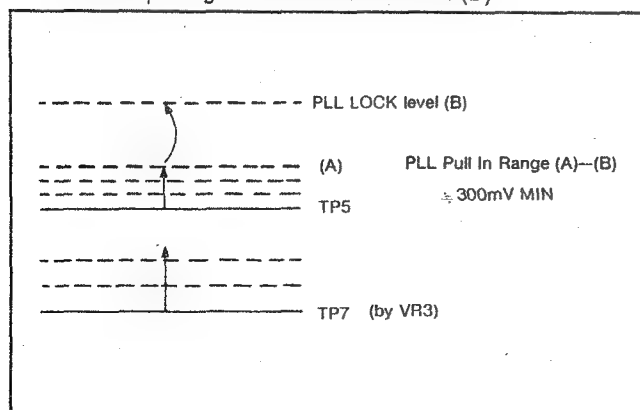


3. Set VR4 to fully clockwise position.



Step 3

1. Adjust VR3 so that the voltage of TP7 goes down and stop turning when the voltage of TP5 becomes out of PLL Pull In Range.
2. Adjust VR3 again so that the voltage of TP7 increases and read the position (A) where the voltage of TP5 starts pulling in to PLL LOCK level (B).



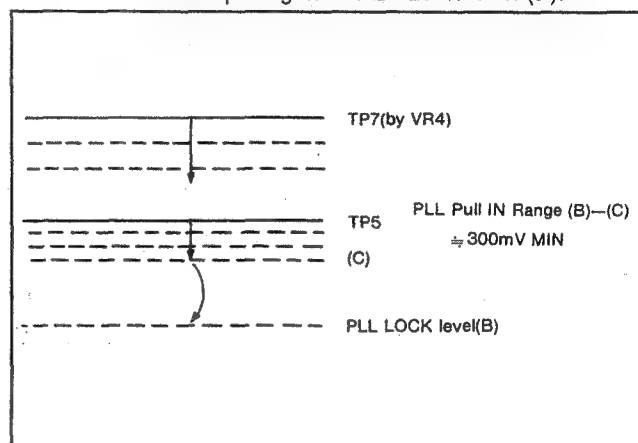
3. If PLL Pull In Range (A)-(B) is far out of 300mV, adjust VR1 (BALANCE VR) to compensate the voltage of TP5.

Note : When adjusting VR1 the voltage of TP5 must be out of PLL pull in Range position.

4. Repeat <STEP 3> 1, 2, 3 until PLL In Range becomes 300mV.

Step 4

1. Adjust VR3 so that the voltage of TP7 is fully increased.
2. Adjust VR4 so that the voltage of TP7 is increased further and stop turning when the voltage of TP5 becomes out of PLL Pull In Range.
3. Adjust VR4 again so that the voltage of TP7 decreases and read the position (C) where the voltage of TP5 starts pulling in to PLL Lock level (B).



4. Confirm that the PLL Pull In Range (B)-(C) is the same level as (A)-(B).

If not balanced, readjust VR1 and repeat <STEP 3> and <STEP 4> until the both range are balanced.

Step 5

1. After balance adjustment VR1 is completed, set the voltage of TP7 to the PLL Lock level (B) position by either VR3 or VR4.

<For CH0 playback>

Step 6

1. Follow the same procedure <STEP 1> to <STEP 5> for CH0 playback.

Step 7

1. Make AJ-D320 to FF/REW mode and confirm that the PLL Lock voltage (B) at TP5 (CH1), TP6 (CH0) is still Locked.

8-2. Error Rate Adjustment

Board	PB 0
T.P.	Video Out 1
Adj.	VC2 for CH0 / VC1 for CH1
Input	Color Bar
Tape	Blank Tape
Mode	Self REC / Playback (Shuffling OFF mode)
M.EQ.	Monitor
Spec.	Minimize Error on the monitor

Step 1

Playback the self-Recorded Tape.

Step 2

Adjust VC2 (CH0), VC1 (CH1) so that the error on the monitor is minimized.

Step 3

After the adjustment of VC2, VC1 is completed, previous adjustment 8.1 PLL Lock voltage has to be re-confirmed.

9. PlayBack 2 Section

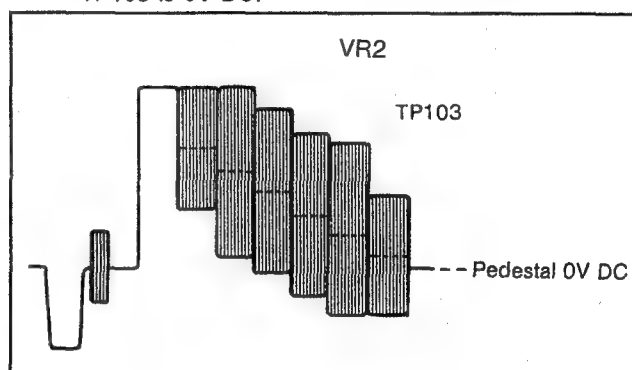
- Note :**
1. Set the SHUFFLING to ON mode.
 2. Set SW 3002-2, 3, 4, 5, 6 on PLAYBACK 2 BOARD to ON position.

9-1. Video DC/Level Adjustment

Board	PB 0
T.P.	Video Out 1
Adj.	VR2 (DC), VR1 (Video Level)
Input	-----
Tape	Alignment Tape No.1 (Color Bar Portion)
Mode	Playback
M.EQ.	Oscilloscope
Spec.	0VDC Pedestal

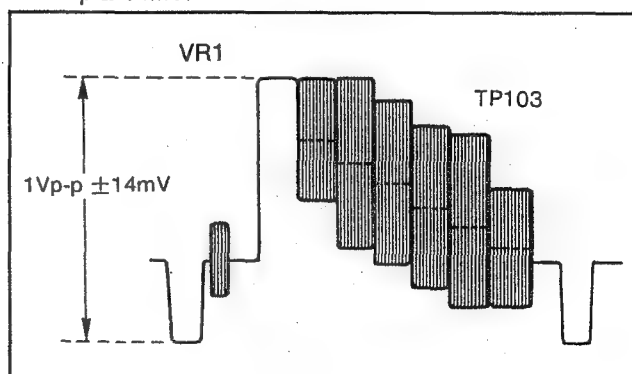
Step 1

1. Playback Color Bar portion of Alignment Tape 1.
2. Adjust VR2 so that the pedestal level of Color Bar at TP103 is 0V DC.



Step 2

1. Adjust VR1 so that the video level at video out is $1V_{p-p} \pm 14mV$.

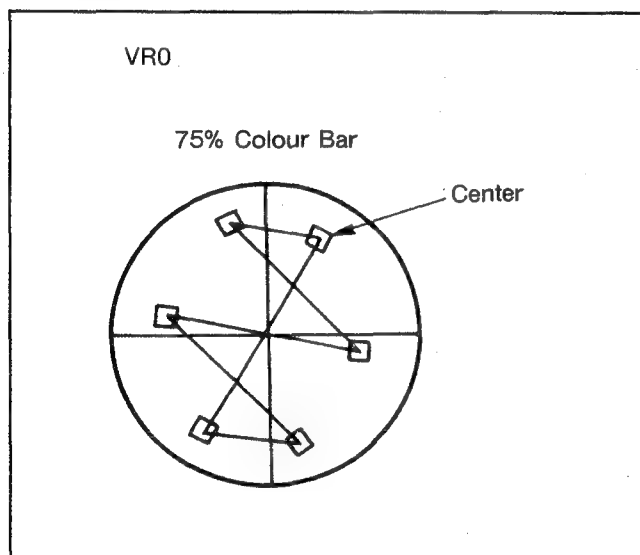


9-2. Video Adjustment

Board	PB 2
T.P.	Video Out 1
Adj.	VR0
Input	-----
Tape	Alignment Tape No.1 (Color Bar portion)
Mode	Playback
M.EQ.	Vectorscope
Spec.	-----

Step 1

1. Playback Color Bar portion of the Alignment Tape No.1.
2. Adjust VR0 so that the Color Bar vector dots are center of vector marker.



10. Audio Section

10-1. E-E Output Level Adjustment

Board	Jack 2
T.P.	Line Out CH1 / Line Out CH2
Adj.	VR4503 (CH1) / VR4504 (CH2)
Input	Color Bar / 1kHz 0dBu
Tape	-----
Mode	Eject
M.EQ.	Audio Analyzer
Spec.	Output Level = +4dBu \pm 0.2dB

Step 1

Set the UNITY/VAR SW to UNITY side.

Step 2

Adjust VR4503 so that the CH1 Line Out Level is +4dBu \pm 0.2dB.

Step 3

Adjust VR4504 so that the CH2 Line Out Level is +4dBu \pm 0.2dB.

NTSC**10-2. PCM Audio Line Out Level Adjustment**

Board	PB 2
T.P.	Audio Line Out
Adj.	VR3003 (CH1), VR3004 (CH2)
Input	-----
Tape	Alignment Tape No.1 Color Bar / PCM 1kHz -20dB
Mode	Playback
M.EQ.	Audio Analyzer
Spec.	Audio Out Level = +4dBu \pm 0.2dB

Step 1

Set the PB VR on the front panel to center position.

Step 2

Playback PCM 1kHz -20dB portion.

Step 3

Adjust VR3003 (CH1) so that Audio Line out level (CH1) is +4dB \pm 0.2dB.

Step 4

Adjust VR3003 (CH2) so that Audio Line out level (CH2) is +4dB \pm 0.2dB.

10-3. A/D Input Level Adjustment

Board	Audio A/D
T.P.	Line Out CH1/CH2
Adj.	VR4303(CH1), VR4304(CH2)
Input	1kHz 0dBu
Tape	Blank Tape
Mode	EJECT→Rec Play
M.EQ.	Audio Level Meter
Spec.	+4dBu \pm 0.2dB

Step 1

Audio Line In

CH1 : 1KHz / 0dBu

CH2 : 1KHz / 0dBu

Step 2

Adjust VR4303(CH1) so that the level meter indicate -20dB in the EJECT mode.

Step 3

Adjust VR4304(CH2) so that the level meter indicate -20dB in the EJECT mode.

Step 4

Record the Color Bar (1kHz/0dBu) for a few minutes and play back this portion.

Confirm the level meter to indicate the +4dBu (\pm 0.2dB). If it is not, repeat the Step 1 through Step 4.

11. Operate Section

11-1. X'tal Adjustment

Board	LCD & TC Operate
T.P.	TP6501
Adj.	VC6501
Input	-----
Tape	-----
Mode	Eject
M.EQ.	Frequency Counter
Spec.	32.7680KHz \pm 0.0001KHz

Step 1

Adjust VC6501 so that frequency is 32.7680KHz \pm 0.0001KHz.

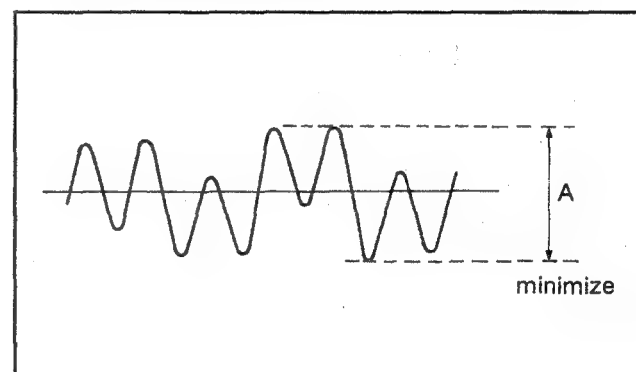
12. F/E Bias Osc Section

12-1. TC BIAS Trap Adjustment (1)

Board	F/E BIAS Osc
T.P.	TP4701
Adj.	FL4701
Input	-----
Tape	Blank Tape
MODE	REC
M.EQ.	Oscilloscope
Spec.	A = MINIMUM

Step 1

Adjust FL4701 so that the portion "A" is minimized.



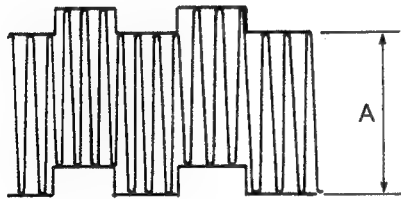
12-2. TC BIAS Trap Adjustment (2)

Board	F/E BIAS OSC
T.P.	TP4703, TP4702
Adj.	VC4701
Input	-----
Tape	Blank Tape
Mode	REC
M.EQ.	Oscilloscope
Spec.	60mV \pm 5mV

Step 1

Adjustment VC4701 so that the portion "A" is 60mV \pm 5mV.

TP4703:HOT
TP4702:GND(COLD)



13. Serial I/F V Section

13-1. VCO Free-Run Adjustment

Board	Serial I/F V
T.P.	TP1 or IC7 pin19
Adj.	VR1
Input	-----
Tape	-----
Mode	Eject
M.EQ.	Frequency Counter
Spec.	64nsec \pm 1nsec

Step 1

Set the SW3 to TEST side.

Step 2

Adjust VR1 so that the VCO frequency is 64nsec(\pm 1nsec).

Step 3

Reset the SW3 to NORMAL side.

PAL Electrical Adjustment Procedures

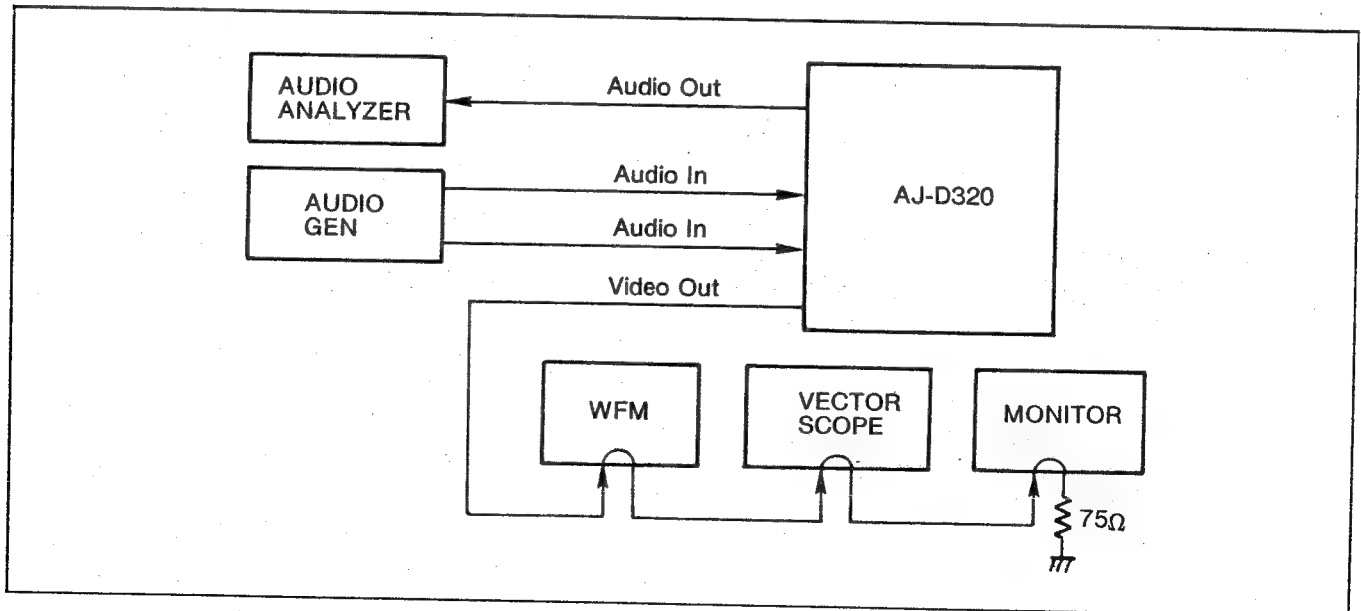
Recommended Test and Measuring Equipments

The following test and measuring equipments are required to conduct the electrical adjustments.

Model No. or Equivalent	Equipment	Remark
2467B TEKTRONIX	Dual Trace Oscilloscope	More than 400MHz
1485R TEKTRONIX	Wave Form Monitor	
521A TEKTRONIX	Vector Scope	
1751 TEKTRONIX	SCH Meter	
1411 TEKTRONIX	Digital Signal Generator	
HP8591A HEWLETT PAKARD	Spectrum Analyzer	
	Digital Volt Meter (D.V.M.)	
	Frequency Counter	
	Audio Level Meter	
	DC Power Supply	12VDC More than 5A

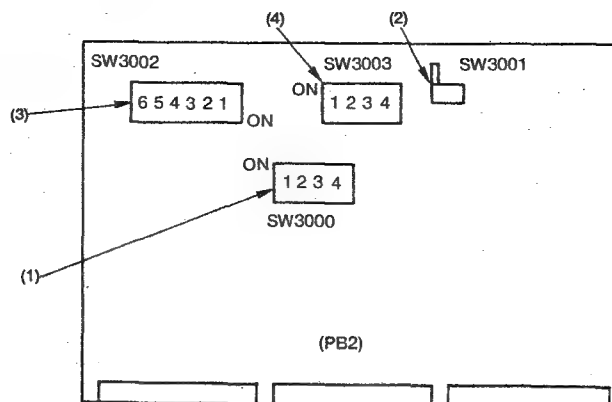
Preparation of Adjustment

1. CONNECTION



Initial Switch Setting (Factory Setting)

PB2 P.C.Board



	SW No.	SW Name	Description	Factory Setting
(1)	SW3000-1	Audio CH Sel BPN	ON : Adapter OFF : Portable	ON
	SW3000-2	Audio 16/18 Sel	ON : 18bit OFF : 16bit	OFF
	SW3000-3	Audio Output Sel	ON : E-E OFF : PB	OFF
	SW3000-4	Audio Playback	ON : Audio CH3,4 playback OFF : Audio CH1,2 playback	OFF
(2)	SW3001	E-E Mode Select	Left : E-E Force mode Right : Full E-E mode	Left
(3)	SW3002-1	Video Mute	ON : When a state in which may errors have occurred continues for 10 or more seconds, the video signals are muted. OFF : No muting	ON
	SW3002-2	Inner ECC	ON : Correction of Inner ECC OFF : No correction	ON
	SW3002-3	Video Outer ECC	ON : Correction of Video Outer ECC OFF : No correction	ON
	SW3002-4	Video Conceal	ON : Concealment of Video OFF : No concealment	ON
	SW3002-5	Audio Outer ECC	ON : Correction of Audio Outer ECC OFF : No correction	ON
	SW3002-6	Audio Interpolation	ON : Concealment of Audio OFF : No concealment	ON
(4)	SW3003-1	Error Rate	ON : Error rate is displayed OFF : No display	OFF
	SW3003-2	Tape SW	ON : No muting in FF/REW mode OFF : Muting in FF/REW mode	ON
	SW3003-3	Not used	-----	OFF
	SW3003-4	For factory use	-----	OFF

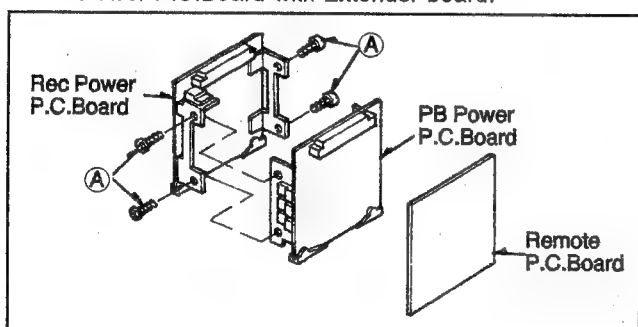
1. Power Supply Section

1-1. Rec Power Adjustment

Board	Rec Power
T.P.	9A(+5V), 11A(-5V), 13A(+9V), 14A(-9V), 18A(+16V), 16A(-2V)
Adj.	VR1001(+5V), VR1002(-5V), VR1003(+9V), VR1004(-9V), VR1005(+16V), VR1006(-2V)
Input	Colour bar
Tape	Blank Tape
Mode	REC PLAY
M.EQ.	D.V.M.
Spec.	DC +5V(± 0.03 V), DC -5V(± 0.03 V), DC +9V(± 0.03 V), DC -9V(± 0.03 V), DC +16V(± 0.03 V), DC -2V(± 0.015 V)

Note :

- (1) Remove the Power unit from the deck.
- (2) Unscrew the 4 screws (A) and separate the Rec Power P.C.Board and PB Power P.C.Board.
- (3) Reinstall the PB Power P.C.Board and extend the Rec Power P.C.Board with Extender board.

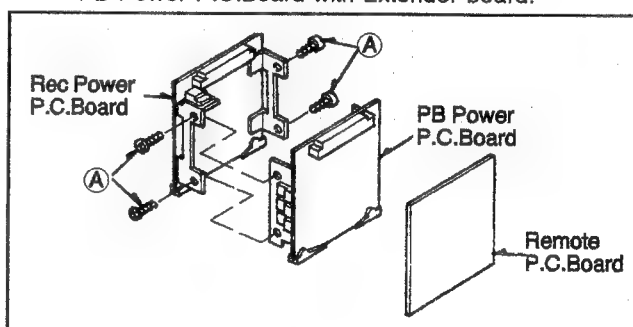


1-2. PB Power Adjustment

Board	Rec Power
T.P.	8B(+5V), 9B(-5V), 10B(+9V), 10A(-9V), 12B(-2V)
Adj.	VR1001(+5V), VR1002(-5V), VR1003(+9V), VR1004(-9V), VR1005(-2V)
Input	-----
Tape	Self Recording Tape or Alignment Tape
Mode	PLAY
M.EQ.	D.V.M.
Spec.	DC +5V(± 0.03 V), DC -5V(± 0.03 V), DC +9V(± 0.03 V), DC -9V(± 0.03 V), DC -2V(± 0.015 V)

Note :

- (1) Remove the Power unit from the deck.
- (2) Unscrew the 4 screws (A) and separate the REC Power P.C.Board and PB Power P.C.Board.
- (3) Reinstall the REC Power P.C.Board and extend the PB Power P.C.Board with Extender board.



2. SERVO SECTION

2-1. T-S OFF SET Voltage Adjustment

Board	Servo 1
T.P.	TP2005
Adj.	VR2001
Input	-----
Tape	-----
Mode	Eject
M.EQ.	D.V.M.
Spec.	2400mV(± 10 mV)

2-2. T-S Gain Adjustment

Board	Servo 1
T.P.	TP2005
Adj.	VR2003
Input	-----
Tape	Cassette Shell only *1
MODE	Stop
M.EQ.	D.V.M.
Spec.	1800mV(± 100 mV)

*1 Make a tape removed cassette shell, and use for this adjustment.

Step 1

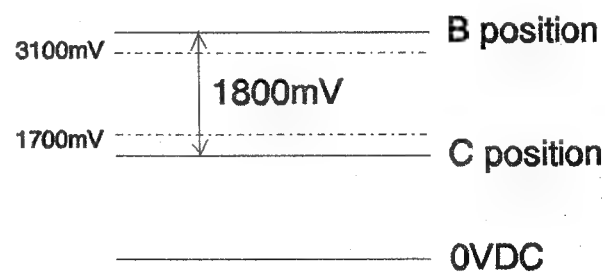
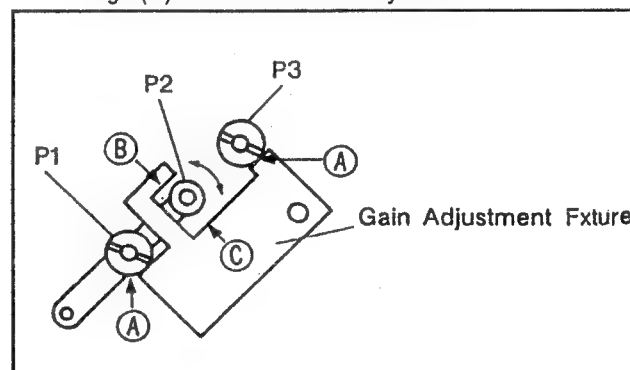
Scope CH1 : TP2005 1V/D 10 μ s/D

Step 2

Set the Gain Adjustment Fixture as shown figure. It should be touched to P1 and P3 post. (A portion)

Step 3

Adjust VR2003 so that the measurement range is 1800mV ± 100 mV when P2 post is moved between left(B) and right(C) side of the fixture by hand.



2-3. PG Shifter Adjustment

Board	Servo 1
T.P.	VIDEO PS BUFF TP3007 SERVO 1 TP2011 (Trigger)
Adj.	SERVICE SET MODE SERVO / PG SHIFTER
Input	Colour Bar of the Alignment Tape (No.1)
Tape	-----
Mode	PLAY
M.EQ.	Oscilloscope
Spec.	$T_2 = T_1 / 2$ ($\pm 2\mu\text{S}$)

[Service Set Mode Operation]

1. MODE : STOP/EJECT
2. SET/OFF/DIAG SW : SET
3. Press HOLD and MENU button more than 2 seconds.
Service set menu is displayed on the Monitor.
(Video Out 2 / TC Super switch on the Sub Panel to ON.)
4. Select the "1.SERVO" by using the Shift Button.
5. Press START button.
(SERVO menu is displayed on the Monitor.)
6. Select the "1.PG SHIFTER" by using the Shift Button.

Step 1

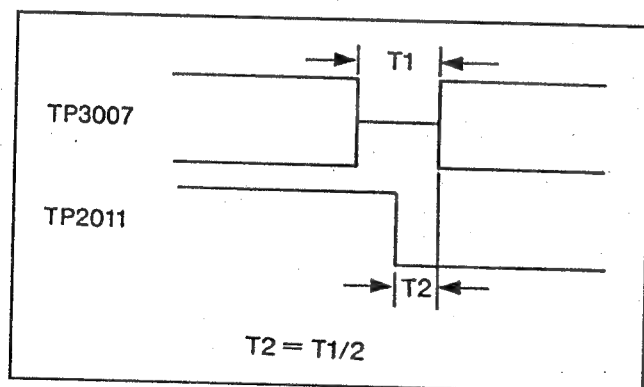
Playback the colour bar portion of the alignment tape.
Press FF or REW button so that $T_2 = T_1 / 2$ (See figure).

Step 2

Press START button for memorizing the data.
Display : Flicker → Steady

Step 3

SET/OFF/DIAG SW : OFF



3. Video PS BUFFER Section 1

3-1. OFF SET Adjustment

Board	Video PS BUF
T.P.	TP3005[RL 0], TP3004[RL 1]
Adj.	VR3002(OFF SET 0), VR3001(OFF SET 1)
Input	-----
Tape	-----
MODE	EJECT
M.EQ.	-----
Spec.	DC 0V ($\pm 100\text{mV}$)

Step 1

Adjust VR3002 so that the TP3005 (RL 0) level is 0V.

Step 2

Adjust VR3001 so that the TP3004 (RL 1) level is 0V.

4. Equalizer Section

4-1 Equalizer Adjustment

Board	Equalizer
T.P.	EXTP23, TP1, TPG2 TP101, TPG102
Adj.	VR1/101[P.SHIFT], VR2/102[FIX FREQ] VR3/103[MAG A], VR4/104[MAG B] VR5/105[COMP BIAS LVL] C10/116[RESON A], C11/117[RESON B]
Input	-----
Tape	Alignment Tape No.2 (Colour Bar portion)
Mode	PLAY
M.EQ.	Oscilloscope
Spec.	Error Rate = See figure

Step 1

1. Turn the SW1 and SW101 on the Equalizer P.C.Board to on. (Install the jumper sw.)
2. Extend the Equalizer P.C.Board by extender board (VFK0688).
3. Turn the SW3002 No.1-6 on the PB 2 P.C.Board to off.

Step 2

Set the shuffling sw to off position.

1. Mode : EJECT or STOP
2. SET/OFF/DIAG SW : DIAG position.
3. Press HOLD and MENU button more than 2 seconds. (Maker Mode menu is displayed on the Monitor.)
4. Select the "1. REC MEMORY" by using a SHIFT button.
5. Press the START button. (REC MEMORY menu is displayed on the Monitor.)
6. Set each item as follows.

- (Factory Set)
1. M.SEQUENCE : ON(ON)
 2. INTRA SHUFFLE : OFF(ON)
 3. FIELD SHUFFLE : OFF(ON)
 4. ERROR RATE : OFF(ON)

(SHIFT button → Select the item
ADV button → ON → OFF)

7. SET/OFF/DIAG SW : OFF position.

Note : Rec Memory data is returned to the factory setting, when turn the power sw to off.

Step 3

Confirmation of PB Adjust data.

1. Mode : EJECT
2. SET/OFF/DIAG SW : SET position
3. Press HOLD and MENU button more than 2 seconds. (Service set menu is displayed on the Monitor.)
4. Select the "5.PB ADJUST" by using a SHIFT button.
5. Press START button. (PB ADJUST menu is displayed on the Monitor.)
6. Select the "1.EQ FREQ" by using a SHIFT button.
7. Confirm the data of each head are "C0".
8. Select the "2.EQ GAIN" by using a SHIFT button.
9. Confirm the data of each head are "C0".
10. If they are not, select the Head by using the ADV button and adjust the data to "C0" by using the FF or REW button.

(FF=Up, REW=Down, HOLD+FF=Up for second Digit
START=Memorizing the data)

Step 4

Setup the error rate menu

1. SW3003-1 : ON
(on the PB2 P.C.Board)
2. SET/OFF/DIAG SW : DIAG
3. Press MENU button.
(Diagnostic menu is displayed on the Monitor.)
4. Select the "6.ERROR RATE" by using the SHIFT button.
5. Press START button.
(ERROR RATE is displayed on the Monitor.)

Note : In the Service Set mode, output signal (Video Out 2) can be selected by RESET button.
(Normal picture → CH0 picture → CH1 picture)

Step 5

1. Playback the Colour bar portion of the Alignment tape and adjust the following VRs so that the digital error on the playback picture is minimized.

ch0 Head	ch1 Head	VR Name
VR1	VR101	[PHASE SHIFT]
VR5	VR105	[COMP BIAS LVL]
VR2	VR102	[FIX FREQ]
C10	C116	[RESON A]
C11	C117	[RESON B]

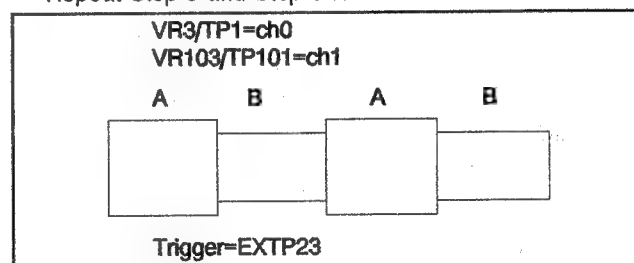
Step 6

Scope CH1 : TP1/ch0, TP101/ch1

Scope CH2 : EXTP23 (Trigger)

Adjust VR3/ch0, VR103/ch1[MAG A] and VR4/ch0, VR104/ch1[MAG B] so that the RF signal of ch0A and ch0B become same and maximum level. Digital error on the playback picture is minimized as shown figure.

Repeat Step 5 and Step 6 for a few times.



Step 7

Confirm the error rate.

2. Confirm the each error rate as follows.

Video Total	Audio Total	ch0A	ch0B	ch1A	ch1B
-4.0<	-3.5<	-3.5<	-3.5<	-3.5<	-3.5<

3. If it is not, readjust Step 5 to Step 7 or Rec Current adjustment or Mechanical adjustment.

Step 8

Final confirmation

1. Set the shuffling sw to on. (Refer to Step 2)
2. Set the SW3002 No.1-6 to on position on the PB2 P.C.Board.
3. Playback the Alignment Tape No2.
4. Confirm the playback picture on the monitor is no error.

Step 9

Remove the jumper sw from the SW1 and SW101 on the Equalizer P.C.Board.

5. Video PS Buffer Section 2

5-1. Duty Adjustment

Board	Video PS BUF
T.P.	TP3012, TP3010
Adj.	SERVICE SET MODE RF ADJUST / DUTY ADJUST TEST
Input	Colour Bar
Tape	Blank Tape
MODE	EJECT → REC
M.EQ.	Oscilloscope
Spec.	A / B = 50 / 50

[Service Set Mode Operation]

1. MODE : EJECT / STOP
2. SET/OFF/DIAG SW : SET position
3. Press HOLD and MENU button more than 2 seconds.
(Service Set menu is displayed on the Monitor.)
4. Select the "2.RF ADJUST" by using a SHIFT button.
5. Press START button.
(RF ADJUST menu is displayed on the Monitor.)
6. Select the "4.DUTY ADJUST TEST" by using the SHIFT button.

[Duty (CH 0A · 0B) Adjustment]

Step 1

Scope CH1 : TP3012 500mV/D, 10μs/D

Step 2

Select the CH0A by using the ADV button on the Monitor.

Step 3

Place the unit in the Recording mode.

Step 4

Press the FF or REW button so that the Duty is 50% as shown figure. After adjustment, press the START button for memorizing the adjustment data.

Step 5

Select the CH0B by using the ADV button, and perform the same adjustment Step 4.

[Duty (CH 1A · 1B) Adjustment]

Step 1

Scope CH1 : TP3010 500mV/D, 10μs/D

Step 2

Select the CH1A by using the ADV button on the Monitor.

Step 3

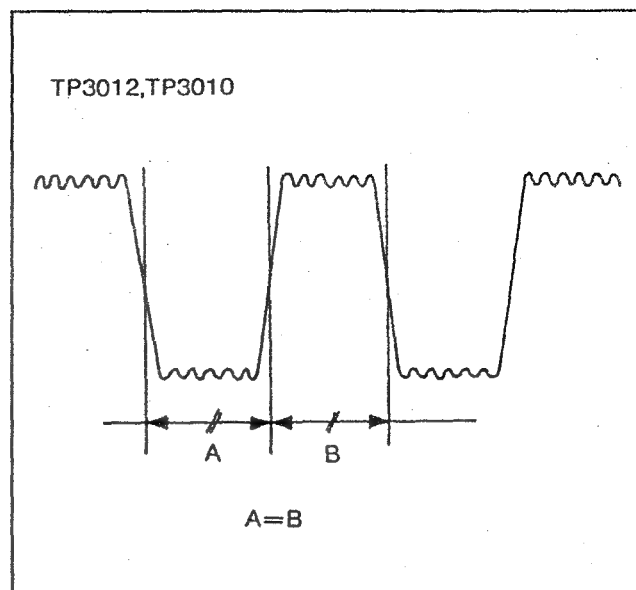
Place the unit in the Recording mode.

Step 4

Press the FF or REW button so that the Duty is 50% as shown figure. After adjustment, press the START button for memorizing the Adjustment data.

Step 5

Select the CH1B by using the ADV button, and perform the same adjustment Step 4.



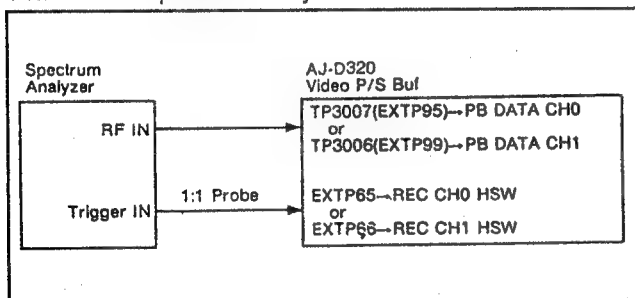
5-2. REC Current Adjustment

Board	Video PS BUF
T.P.	TP3007(EXTP95), TP3006(EXTP99) EXTP65, EXTP66
Adj.	SERVICE SET MODE RF ADJUST / REC CURRENT VR3005(REC F 0A), VR3006(REC F 0B), VR3003(REC F 1A), VR3004(REC F 1B)
Input	Colour Bar
Tape	Alignment Tape No.1 (Color Bar portion)
MODE	Playback → REC
M.EQ.	Spectrum Analyzer
Spec.	-----

[Spectrum Analyzer Setting]

START : 0 Hz
 STOP : 50MHz
 RBW : 300KHz
 VBW : 1KHz
 REF LEVEL : -10.0dBm
 ATT : 10dB
 DIV : 5dB
 SWP : 300msec
 TRIG : EXT

Connect the Spectrum Analyzer as follows.



Step 1

Playback the colour bar portion of the alignment tape No.2 and memorize this spectrum by CH B of spectrum analyzer.

Step 2

Place the unit in the Service Set Mode as follows.

1. MODE : EJECT
2. SET/OFF/DIAG SW : SET position
3. Press HOLD and MENU button more than 2 seconds.
(Service Set menu is displayed on the Monitor.)
4. Select the "2. RF ADJUST" by using a SHIFT button.
5. Press START button.
(RF ADJUST menu is displayed on the Monitor.)
6. Select the "2. REC CURRENT" by using the SHIFT button.
7. Select the CH0A or CH0B by using the ADV button.

Step 3

Place the unit in the recording mode.

Step 4

Adjust VR3005(ch0A), VR3006(ch0B) and ch0A, ch0B rec current of the Service Set so that the alignment tape spectrum and confidence playback spectrum become same spectrum.

Note : Rec Current of the service set

FF : Increase

REW : decrease

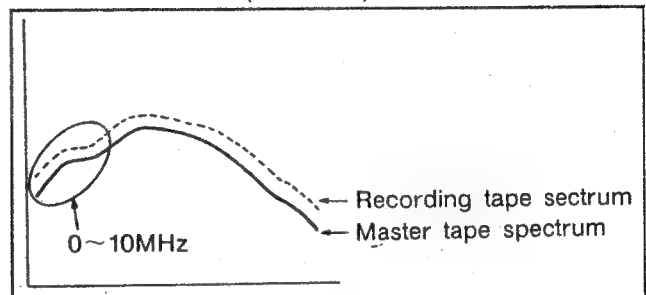
After setting the ch0A, press the START button for memorizing the setting data and then go to ch0B.

Step 5

Perform the same adjustment step 1 to step 4 for the ch1A and ch1B.

T.P. : TP3006(EXTP99) PB DATA CH1
EXTP66 for trigger

Adj. : VR3003(REC F 1A)
VR3004(REC F 1B)



Step 6

Confirm the error of the confidence playback picture. If the error is appeared on the picture, readjust the all VRs and setting until error is minimized on the picture. (Shuffling = off / refer to Equalizer adjustment) (SW3002 No.1-6 / PB2 P.C.Board = off)

Step 7

Record the colour bar signal for a few seconds and playback this portion.

Confirm the error rate as follows.

Video Total	Audio Total	ch0A	ch0B	ch1A	ch1B
-4.0<	-3.5<	-3.5<	-3.5<	-3.5<	-3.5<

If it is not, repeat step 1 - 7.

6. VIDEO A/D PLL Section

6-1. APC OFF SET DC Adjustment

Board	Video A/D PLL
T.P.	TP3207
Adj.	VR3202
Input	Colour Bar
Tape	-----
Mode	Eject
M.EQ.	Oscilloscope
Spec.	DC 2.7V (+0V/-0.1V)

Step 1

Scope CH1 : TP3207 500mV/D, 10 μ s/D

Step 2

Adjust VR3202 so that DC voltage is 2.7V(+0V/-0.1V).

6-2. Reference Clock Adjustment

Board	Video A/D PLL
T.P.	TP3212
Adj.	VC3201
Input	Colour Bar
Tape	-----
Mode	Eject
M.EQ.	Frequency Counter
Spec.	14.31818MHz (\pm 100Hz)

Step 1

Freq. Counter : TP3212

Step 2

Adjust VC3201 so that the Reference Clock is 14.31818MHz (\pm 100Hz).

6-3. A/D Input Level Adjustment

Board	Video A/D PLL
T.P.	TP3101, Video Out 1
Adj.	VR3101(AGC 0 LVL), VR3102(CLAMP DC) VR3103(AGC LVL)
Input	Colour Bar
Tape	-----
Mode	Eject
M.EQ.	Oscilloscope / W.F.M.
Spec.	-----

Step 1

Scope CH1 : TP3101 100mV/D, 10 μ s/D

Step 2

Adjust VR3101 so that the (A) portion is 420mV (\pm 10mV).

Step 3

W.F.M. : Video Out 1

Step 4

Place the unit in the Full E-E mode.

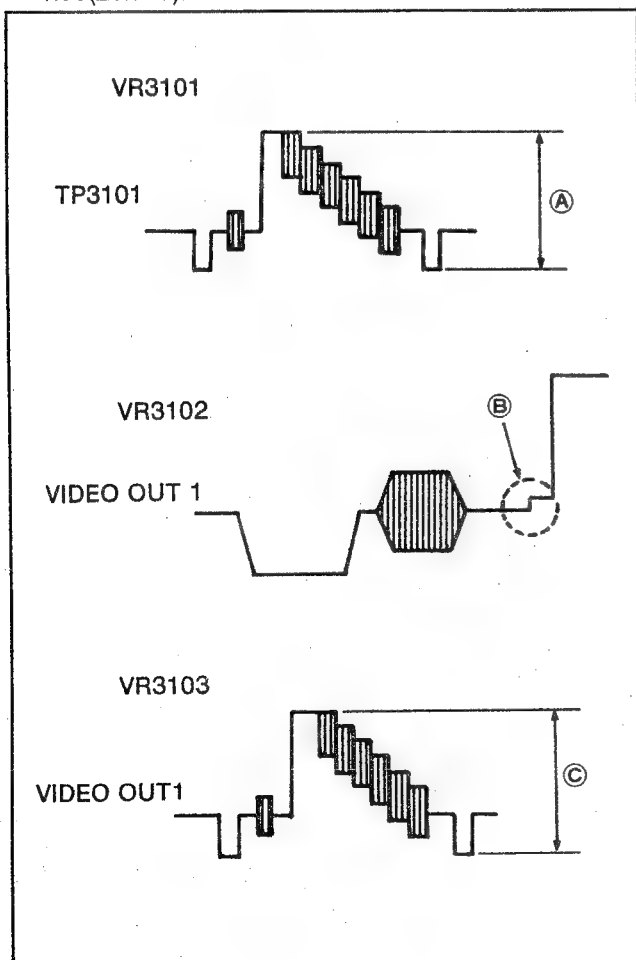
(Keep on pressing the REC Button or set the SW1 on the PB2 P.C.Board to Full E-E position.)

Step 5

Adjust VR3102 so that the (B) portion becomes flat.

Step 6

Adjust VR3103 so that the Video Out Level (C) is 1.0V(\pm 0.01V).



6-4. Video Phase Adjustment 1

Board	Video A/D PLL
T.P.	TP3103, EXTP12, TP3211, TP3209
Adj.	VR3201 (H PHASE)
Input	Colour Bar
Tape	-----
Mode	Eject
M.EQ.	Oscilloscope
Spec.	-----

Step 1

Scope CH1 : TP3103

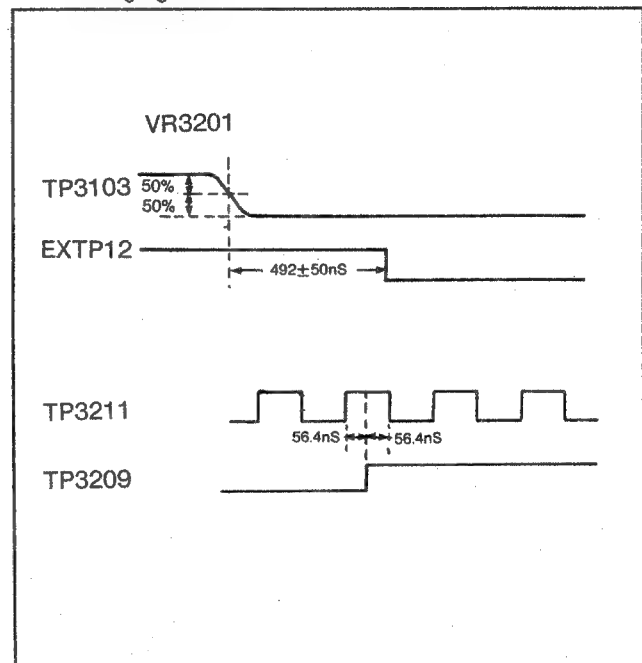
Scope CH2 : EXTP12

Scope CH3 : TP3211

Scope CH4 : TP3209

Step 2

Adjust VR3201 so that the each signals phase become as following figure.



6-5. Video Phase Adjustment 2

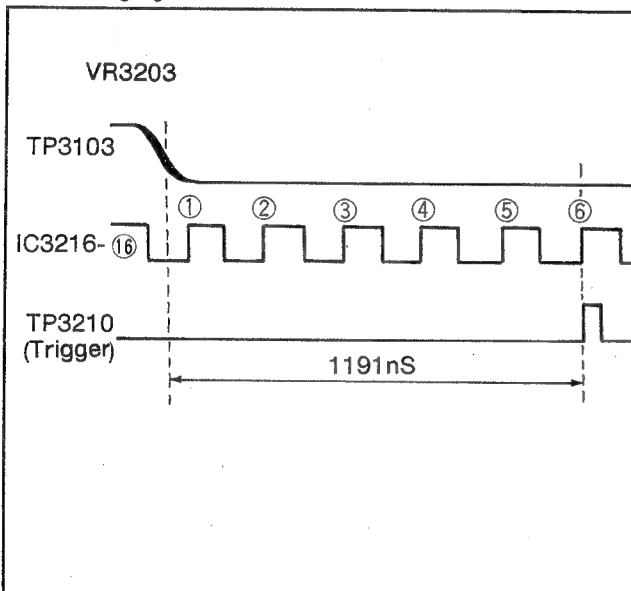
Board	Video A/D PLL
T.P.	TP3103, IC3216 Pin16, TP3210
Adj.	VR3203(SCH ADJ)
Input	Colour Bar
Tape	-----
Mode	Eject
M.EQ.	Oscilloscope
Spec.	-----

Step 1

Scope CH1 : TP3103
 Scope CH2 : IC3216 pin16
 Scope CH3 : TP3210

Step 2

Adjust VR3203 so that the each signal phase become as following figure.



7. Video NSTD Section

7-1. AFC BF Position Adjustment

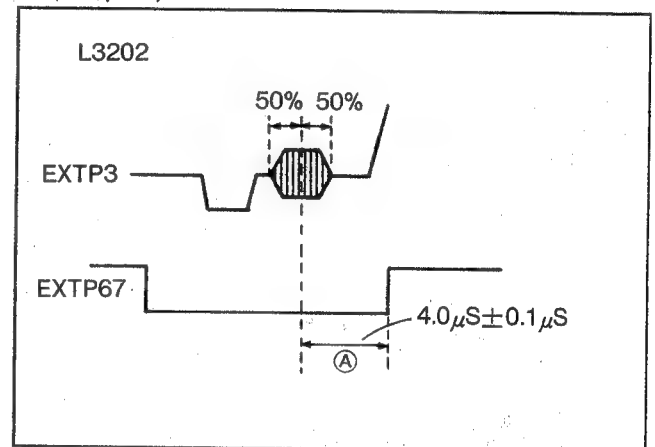
Board	Video NSTD
T.P.	EXTP3, EXTP67
Adj.	L3202
Input	Colour Bar
Tape	-----
Mode	Eject
M.EQ.	Oscilloscope
Spec.	A=4.5 μ s (\pm 0.1 μ s)

Step 1

Scope CH1 : EXTP3
 Scope CH2 : EXTP67

Step 2

Adjust L3202 so that the (A) portion is 4.5 μ sec (\pm 0.1 μ sec).



7-2. NSTD Chroma Phase Adjustment

Board	Video NSTD
T.P.	Video Out 1
Adj.	VR3301, VR3302
Input	Colour Bar
Tape	-----
Mode	Eject (Full E-E mode)
M.EQ.	Vectorscope
Spec.	-----

Step 1

Vectorscope : Video Out 1

Step 2

Place the unit in the full E-E mode.

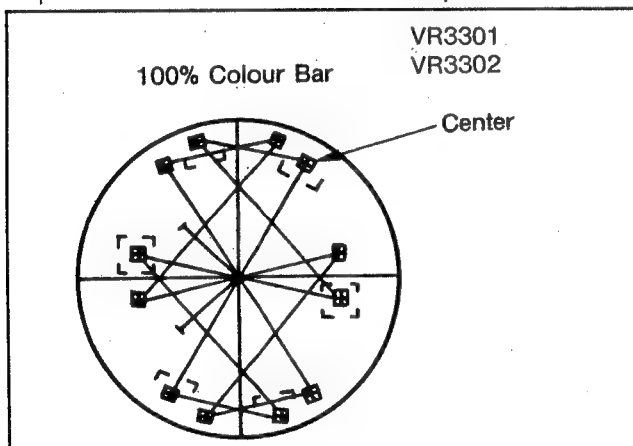
(Keep on pressing the REC button or set SW1 on the PB2 P.C.Board to on position.)

Step 3

Set the SW3201 on the Video A/D PLL P.C.Board to TEST side.

Step 4

Adjust VR3301 and VR3302 so that the each chroma phase is in the inner box of vectorscope.



8. PlayBack 0 Section

Note : When adjusting either CH0 or CH1 side, display picture of a channel on the monitor which you want to adjust.

Operating instruction to display either CH0 or CH1 picture is as follows.

1. Set SET/OFF/DIAG SW to DIAG position .
2. Press <MENU> button.
3. Press <RESET> button so that playback picture from Video Out 1 is changed as follows.

NORMAL → CH0 → CH1

8-1. PLL Lock Voltage Adjustment

Board	PB 0
T.P.	TP6, TP8 for CH0 / TP5, TP7 for CH1
Adj.	VR2, VR5, VR6 for CH0 VR1, VR3, VR4 for CH1
Input	-----
Tape	Alignment Tape No.2 (Colour Bar portion)
Mode	Playback (Shuffling OFF mode)
M.EQ.	Oscilloscope
Spec.	PLL pull in range $\pm 300\text{mV}$ MIN

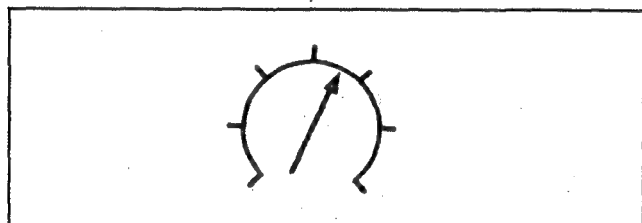
<For CH1 playback>

Step 1

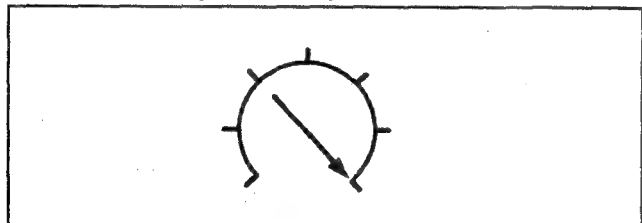
1. Scope CH1 : TP5
Scope CH2 : TP7
2. Set Oscilloscope GND level of CH1 and CH2 are the same level.

Step 2

1. Playback the colour bar portion of the Alignment Tape No.2.
2. Set VR2 to 1 o'clock position.

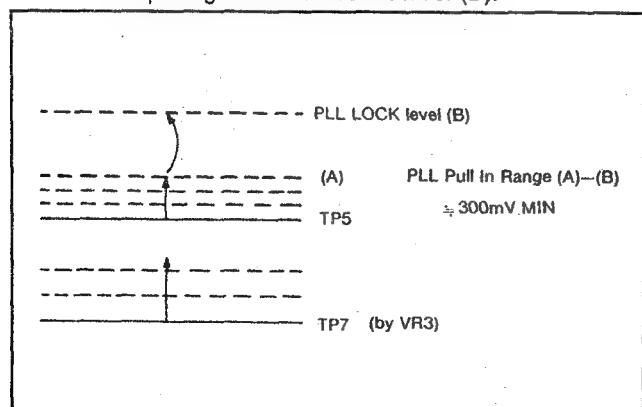


3. Set VR4 to fully clockwise position.



Step 3

1. Adjust VR3 so that the voltage of TP7 goes down and stop turning when the voltage of TP5 becomes out of PLL Pull In Range.
2. Adjust VR3 again so that the voltage of TP7 increases and read the position (A) where the voltage of TP5 starts pulling in to PLL LOCK level (B).



3. If PLL Pull In Range (A)-(B) is far out of 300mV, adjust VR1 (BALANCE VR) to compensate the voltage of TP5.

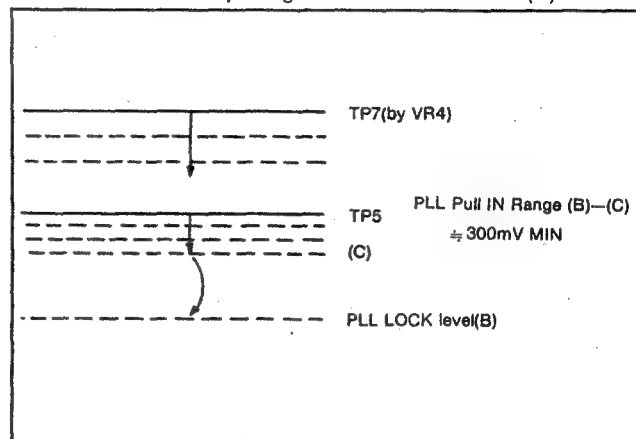
Note : When adjusting VR1 the voltage of TP5 must

be out of PLL pull In Range position.

4. Repeat <STEP 3> 1, 2, 3 until PLL In Range becomes 300mV.

Step 4

1. Adjust VR3 so that the voltage of TP7 is fully increased.
2. Adjust VR4 so that the voltage of TP7 is increased further and stop turning when the voltage of TP5 becomes out of PLL Pull In Range.
3. Adjust VR4 again so that the voltage of TP7 decreases and read the position (C) where the voltage of TP5 starts pulling in to PLL Lock level (B).



4. Confirm that the PLL Pull In Range (B)-(C) is the same level as (A)-(B).
If not balanced, readjust VR1 and repeat <STEP 3> and <STEP 4> until the both range are balanced.

Step 5

1. After balance adjustment VR1 is completed, set the voltage of TP7 to the PLL Lock level (B) position by either VR3 or VR4.

<For CH0 playback>

Step 6

1. Follow the same procedure <STEP 1> to <STEP 5> for CH0 playback.

Step 7

1. Make AJ-D320 to FF/REW mode and confirm that the PLL Lock voltage (B) at TP5 (CH1), TP6 (CH0) is still Locked.

8-2. Error Rate Adjustment

Board	PB 0
T.P.	Video Out 1
Adj.	VC2 for CH0 / VC1 for CH1
Input	Colour Bar
Tape	Blank Tape
Mode	Self REC / Playback (Shuffling OFF mode)
M.EQ.	Monitor
Spec.	Minimize Error on the monitor

Step 1

Playback the self-Recorded Tape.

Step 2

Adjust VC2 (CH0), VC1 (CH1) so that the error on the monitor is minimized.

Step 3

After the adjustment of VC2, VC1 is completed, previous adjustment 8.1 PLL Lock voltage has to be re-confirmed.

9. PlayBack 2 Section

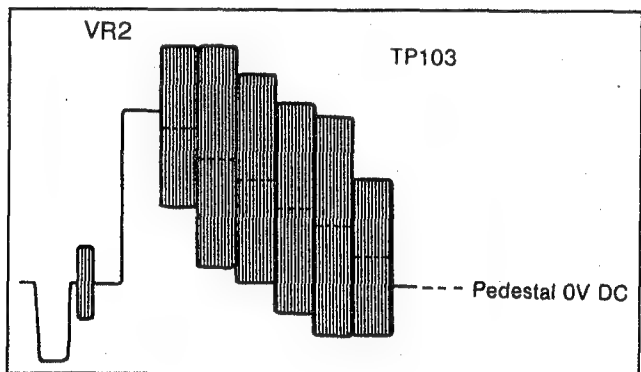
- Note :**
1. Set the SHUFFLING to ON mode.
 2. Set SW 3002-2, 3, 4, 5, 6 on PLAYBACK 2 BOARD to ON position.

9-1. Video DC/Level Adjustment

Board	PB 0
T.P.	Video Out 1
Adj.	VR2 (DC), VR1 (Video Level)
Input	-----
Tape	Alignment Tape No.1 (Colour Bar Portion)
Mode	Playback
M.EQ.	Oscilloscope
Spec.	0VDC Pedestal

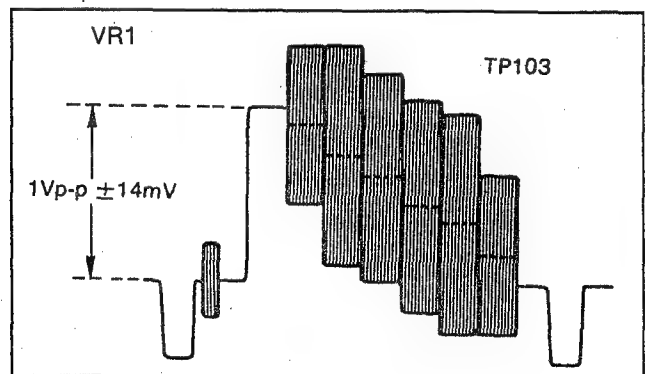
Step 1

1. Playback Colour Bar portion of Alignment Tape 1.
2. Adjust VR2 so that the pedestal level of Colour Bar at TP103 is 0V DC.



Step 2

1. Adjust VR1 so that the video level at video out is 1Vp-p ± 14 mV.

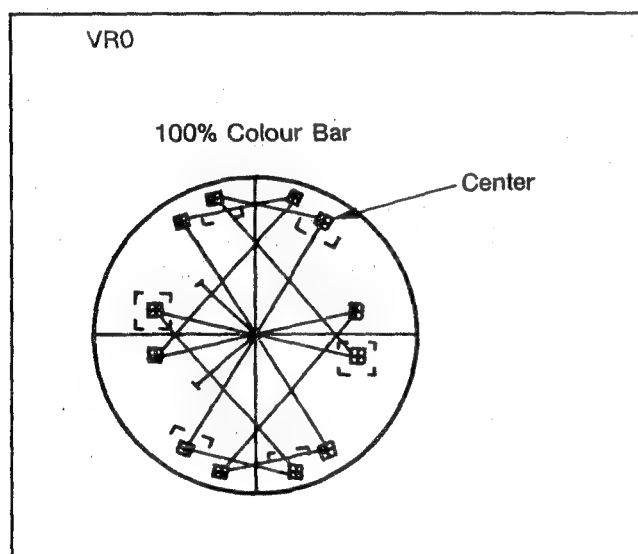


9-2. Video Adjustment

Board	PB 2
T.P.	Video Out 1
Adj.	VR0
Input	-----
Tape	Alignment Tape No.1 (Colour Bar portion)
Mode	Playback
M.EQ.	Vectorscope
Spec.	-----

Step 1

1. Playback Colour Bar portion of the Alignment Tape No.1.
2. Adjust VR0 so that the Colour Bar vector dots are center of vector marker.



10. AUDIO Section

10-1. E-E Output Level Adjustment

Board	Jack 2
T.P.	Line Out CH1 / Line Out CH2
Adj.	VR4503 (CH1) / VR4504 (CH2)
Input	Colour Bar / 1kHz 0dBu
Tape	-----
Mode	Eject
M.EQ.	Audio Analyzer
Spec.	Output Level = 0dBu \pm 0.2dB

Step 1

Set the UNITY/VAR SW to UNITY side.

Step 2

Adjust VR4503 so that the CH1 Line Out Level is 0dBu \pm 0.2dB.

Step 3

Adjust VR4504 so that the CH2 Line Out Level is 0dBu \pm 0.2dB.

10-2. PCM Audio Line Out Level Adjustment

Board	PB 2
T.P.	Audio Line Out
Adj.	VR3003 (CH1), VR3004 (CH2)
Input	-----
Tape	Alignment Tape No.1 Colour Bar / PCM 1kHz -20dB
Mode	Playback
M.EQ.	Audio Analyzer
Spec.	Audio Out Level = 0dBu \pm 0.2dB

Step 1

Set the PB VR on the front panel to center position.

Step 2

Playback PCM 1kHz -20dB portion.

Step 3

Adjust VR3003 (CH1) so that Audio Line out level (CH1) is 0dB \pm 0.2dB.

Step 4

Adjust VR3003 (CH2) so that Audio Line out level (CH2) is 0dB \pm 0.2dB.

10-3. A/D Input Level Adjustment

Board	Audio A/D
T.P.	Line Out CH1/CH2
Adj.	VR4303(CH1), VR4304(CH2)
Input	1kHz 0dBu
Tape	Blank Tape
Mode	EJECT→Rec Play
M.EQ.	Audio Level Meter
Spec.	0dBu \pm 0.2dB

Step 1

Audio Line In

CH1 : 1KHz / 0dBu

CH2 : 1KHz / 0dBu

Step 2

Adjust VR4303(CH1) so that the level meter indicate -20dB in the EJECT mode.

Step 3

Adjust VR4304(CH2) so that the level meter indicate -20dB in the EJECT mode.

Step 4

Record the Colour Bar (1kHz/0dBu) for a few minutes and play back this portion.

Confirm the level meter to indicate the 0dBu (\pm 0.2dB). If it is not, repeat the Step 1 through Step 4.

11. Operate Section

11-1. X'tal Adjustment

Board	LCD & TC Operate
T.P.	TP6501
Adj.	VC6501
Input	-----
Tape	-----
Mode	Eject
M.EQ.	Frequency Counter
Spec.	32.7680KHz \pm 0.0001KHz

Step 1

Adjust VC6501 so that frequency is 32.7680KHz \pm 0.0001KHz.

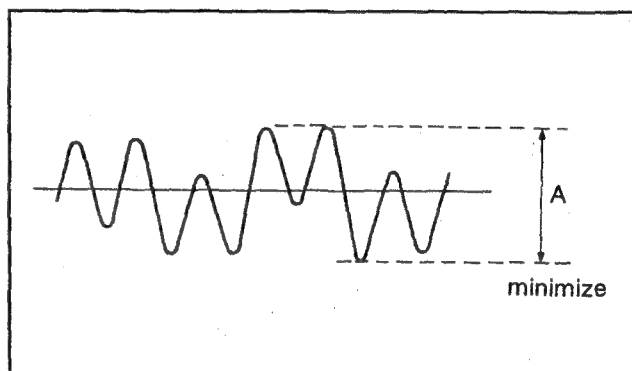
12. F/E Bias Osc Section

12-1. TC BIAS Trap Adjustment (1)

Board	F/E BIAS Osc
T.P.	TP4701
Adj.	FL4701
Input	-----
Tape	Blank Tape
MODE	REC
M.EQ.	Oscilloscope
Spec.	A = MINIMUM

Step 1

Adjust FL4701 so that the portion "A" is minimized.



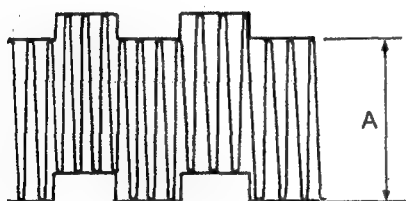
12-2. TC BIAS Trap Adjustment (2)

Board	F/E BIAS OSC
T.P.	TP4703, TP4702
Adj.	VC4701
Input	-----
Tape	Blank Tape
Mode	REC
M.EQ.	Oscilloscope
Spec.	60mV \pm 5mV

Step 1

Adjustment VC4701 so that the portion "A" is 60mV \pm 5mV.

TP4703:HOT
TP4702:GND(COLD)



13. Serial I/F V Section

13-1. VCO Free-Run Adjustment

Board	Serial I/F V
T.P.	TP1 or IC7 pin19
Adj.	VR1
Input	-----
Tape	-----
Mode	Eject
M.EQ.	Frequency Counter
Spec.	56nsec \pm 1nsec

Step 1

Set the SW3 to TEST side.

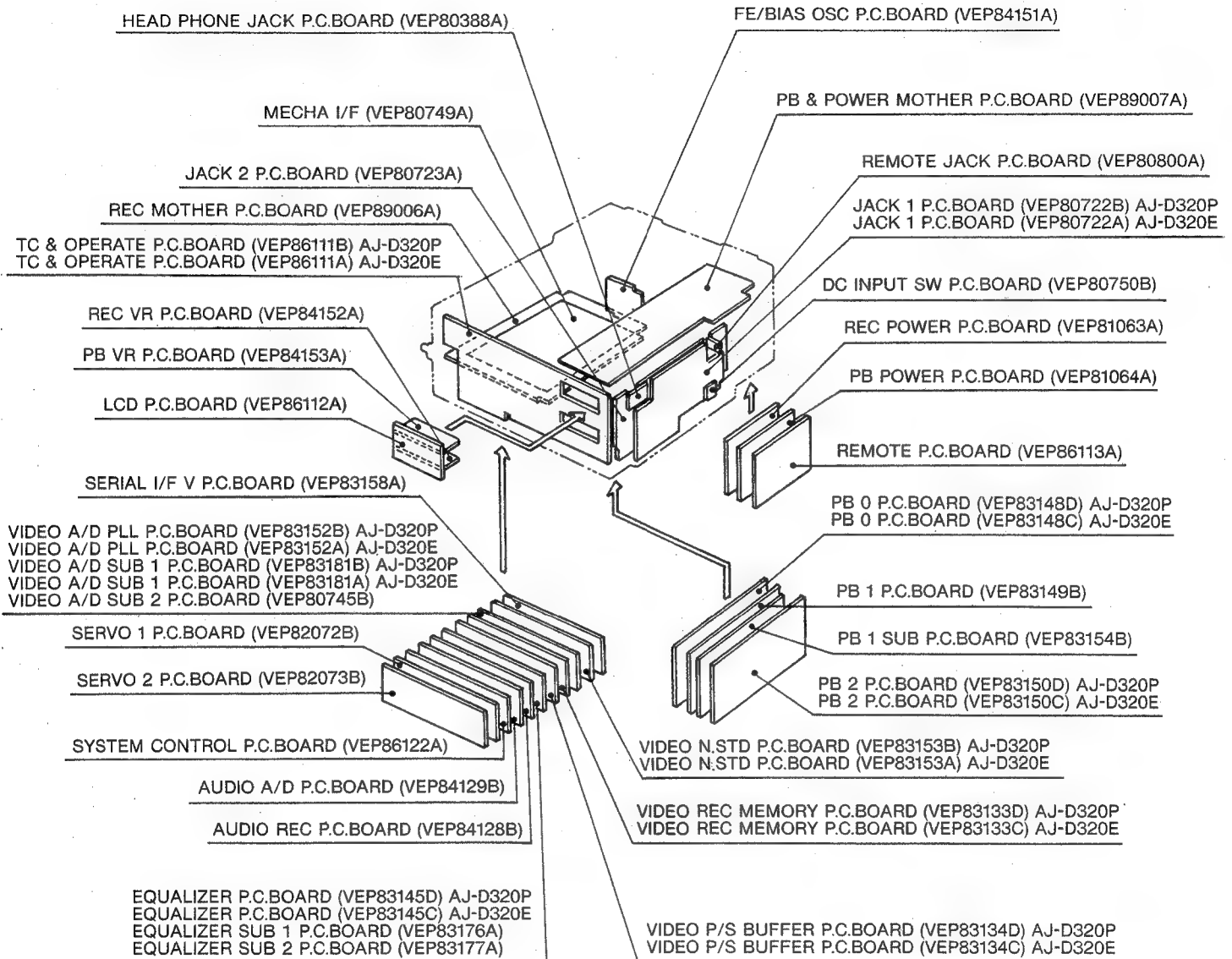
Step 2

Adjust VR1 so that the VCO frequency is 56nsec(\pm 1nsec).

Step 3

Reset the SW3 to NORMAL side.

P.C.BOARD LOCATION



Service Manual

Modules

- *Block Diagrams*
- *Schematic Diagrams*
- *Printed Circuit Boards*

Note:

1. Do not use the part number shown on the schematic diagram or P.C. Board layout for ordering.
The correct part number for ordering is shown in the Exploded Views/Parts List section.
2. Unless otherwise specified, all resistors are in OHMS,
K=1,000 OHMS, all capacitors are in MICROFARADS (μ F), P= μ μ F.

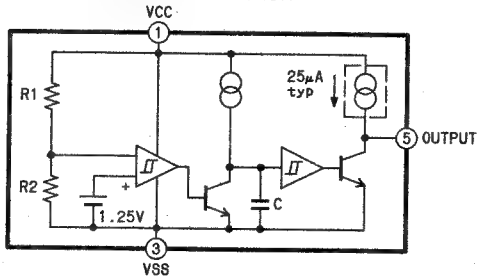
IC INFORMATION CONTENTS

PARTS NO.	PAGE	PARTS NO.	PAGE
51951BML600D	3-1	MB8421-90LPF	3-14
74AC08SJ	3-1	MB88341PF	3-15
74AC157SJ	3-1	MC10125L	3-15
74AC253SJ	3-1	MC14013BF	3-15
74F04SJ	3-2	MC14052BF	3-15
74F11SJ	3-2	MC14053BF	3-16
AK5326	3-2	MC140538BF	3-16
AN3834K	3-3	MC14584BF	3-16
AN91A12S	3-3	MC4044M	3-16
BA6149LS	3-4	MC74HC164F	3-16
BA6435S	3-4	MC74HC245AF	3-16
CXA1451M	3-4	MC74HC373F	3-17
CXD1175AM	3-4	MC74HC541F	3-17
CXD8129K	3-5	MC74HC574AF	3-17
D75P310A	3-6	MC74HC574F	3-17
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HM62832HJP35	3-6	MN1287BF	3-18
LM339DB	3-7	MN4030BS	3-18
M37700S4FP	3-7	MN51040VPI	3-18
M51004J-35T4	3-8	MN67512VAVH2	3-18
M51951AML	3-1	NE5539D	3-18
M5256BFP-70	3-8	NJM062M	3-18
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MB81C78A35PF	3-13	NJM4558M	3-20
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MB8289-25PF	3-14	NJM4565MD	3-20

PARTS NO.	PAGE	PARTS NO.	PAGE
NJM4580ED	3-21	TC7S32F	3-29
NJM5532MD	3-21	TL082CPS	3-29
NJM78L05UA	3-21	TL1451CNS	3-29
NJU7201U50	3-21	TL431CLP	3-29
PC74HC00T	3-22	TL7700CPS	3-29
PC74HC02T	3-22	TMS4C1060D3L	3-30
PC74HC08T	3-22	UPC4741G2	3-30
PC74HC123T	3-22	UPD42102G-3	3-30
PC74HC125T	3-22	UPD65240G057	3-31
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PC74HC157T	3-1	UPD71055GB	3-34
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PC74HC221T	3-23	VCR0350	3-35
PC74HC32T	3-23	VCR0351	3-35
PC74HC4053T	3-24	VCR0352	3-36
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PC74HC73T	3-24	VCR0354	3-37
PC74HC74T	3-25	VSC3KI007FL	3-37
PC74HC75T	3-24	VSC3KI128FL	3-38
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PC74HCU04T	3-25		
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TC4S66F	3-28		
TC74HC4094AF	3-28		
TC7S00F	3-29		
TC7S04F	3-29		

51951BML600D

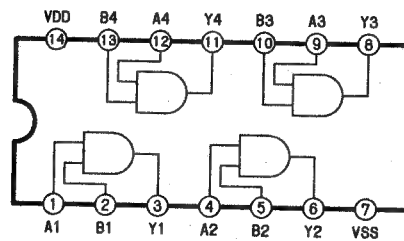
(VOLTAGE DETECTOR/DELAY CIRCUIT)



74AC08SJ

(QUAD 2-INPUT AND GATE)

(TOP VIEW)

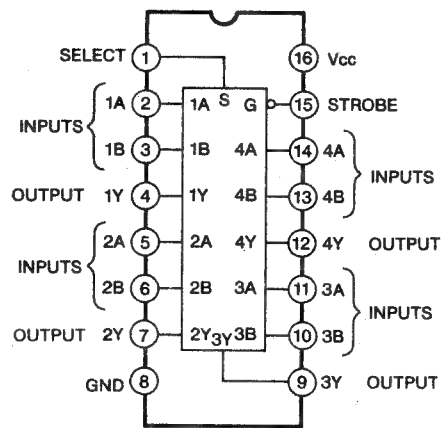


TRUTH TABLE

INPUTS		OUTPUTS
A	B	Y
L	L	L
L	H	L
H	L	L
H	H	H

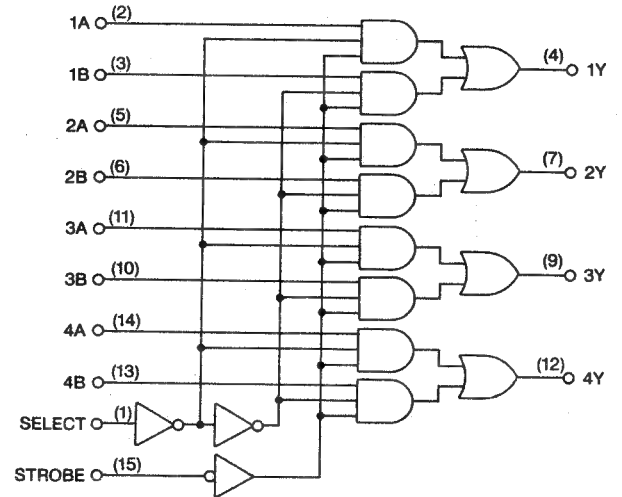
74AC157SJ

(2 TO 1 DATA SELECTORS)



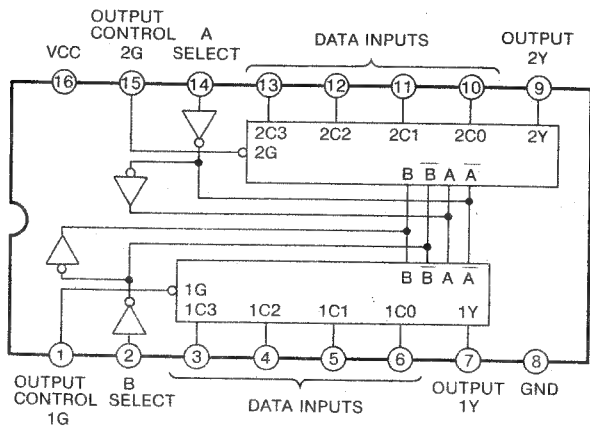
FUNCTION TABLE

INPUTS		OUTPUT Y
Select	Strobe G	Y
X	H	L
L	L	A
H	L	B



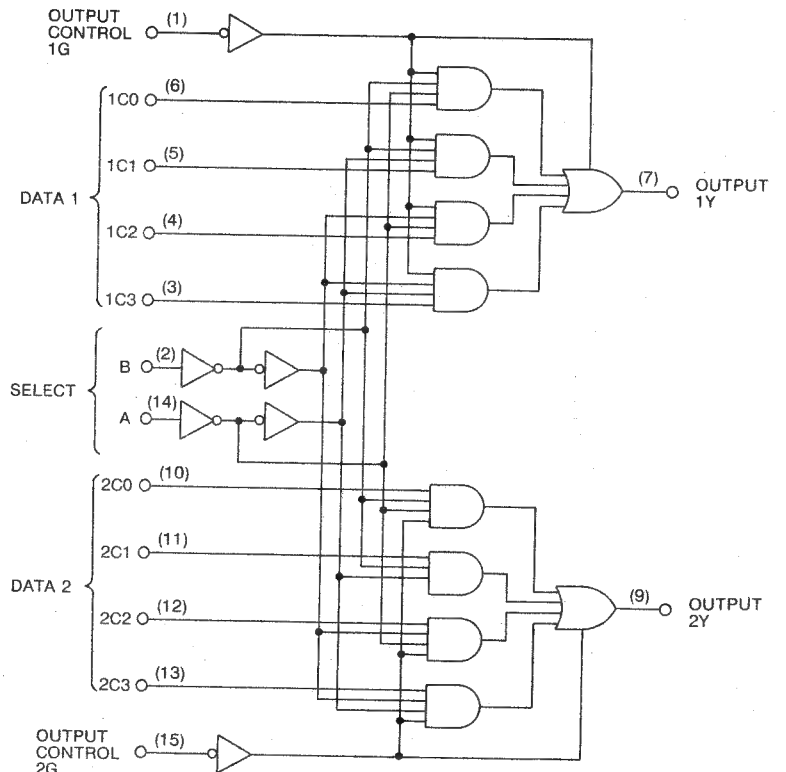
74AC253SJ

(DUAL 3-STATE 4 TO 1 DATA SELECTORS)

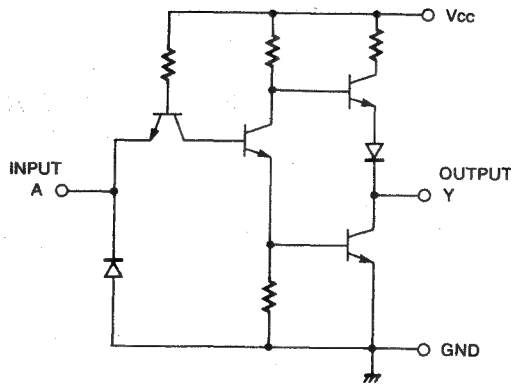
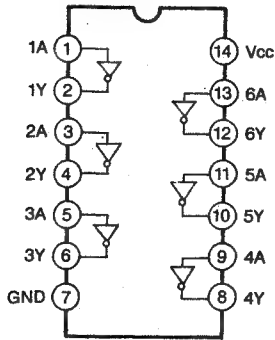


FUNCTION TABLE

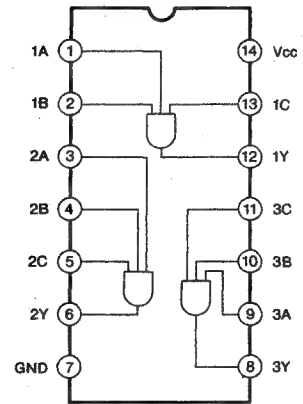
INPUTS			OUTPUT
SELECT	OUTPUT CONTROL G		Y
B A			
X X	H		Z
L L	L		C0
L H	L		C1
H L	L		C2
H H	L		C3



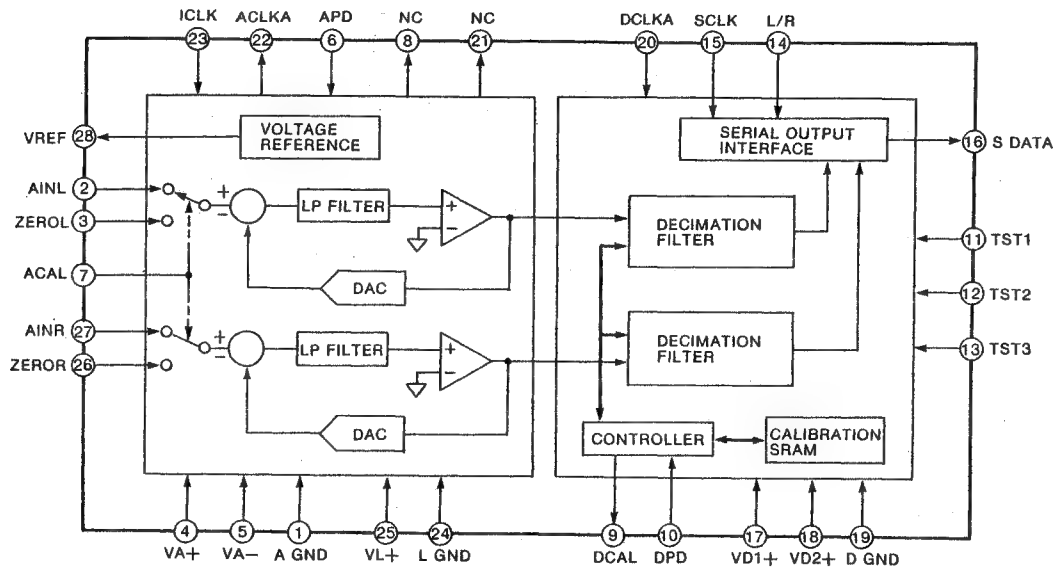
74F04SJ (HEX INVERTERS)



74F11SJ (TRIPLE 3-INPUT AND)

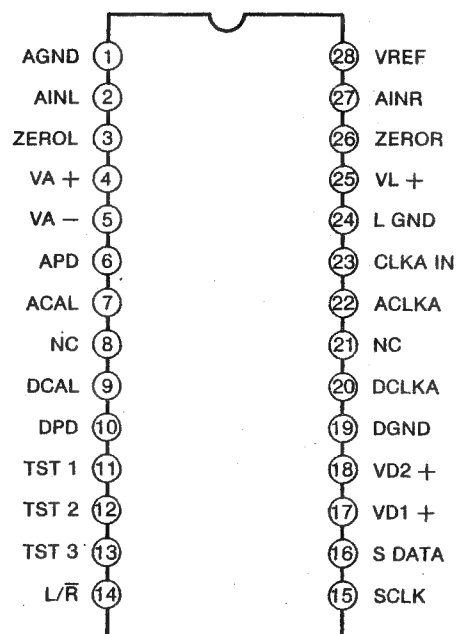


AK5326 (16BIT A/D CONVERTER)

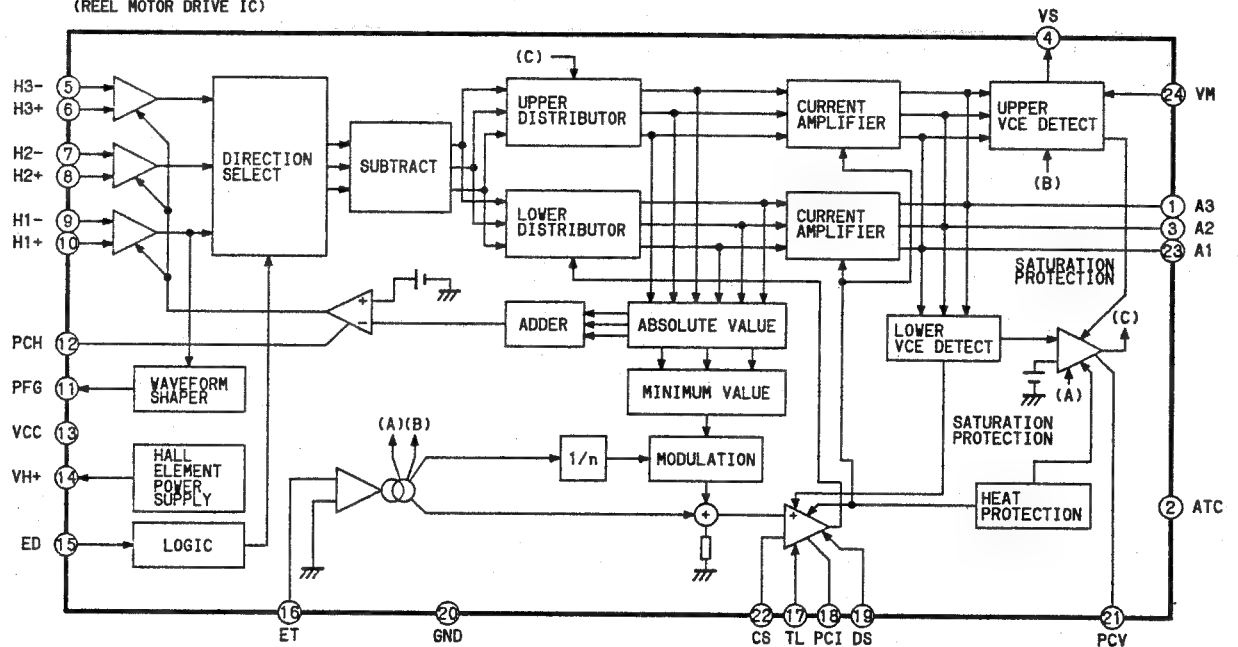


AK5326

PIN NO.	PIN NAME	I/O	DESCRIPTION
1	AGND	—	ANALOGUE GND
2	AINL	I	ANALOGUE INPUT (L CHANNEL)
3	ZEROL	I	ZERO LEVEL INPUT (L CHANNEL)
4	VA +	—	+5V (ANALOGUE)
5	VA -	—	-5V (ANALOGUE)
6	APD	I	ANALOGUE POWER DOWN HIGH
7	ACAL	I	ANALOGUE CALIBRATION PIN
8	NC	—	NO CONNECTION
9	DCAL	O	DIGITAL CALIBRATION PIN
10	DPD	I	DIGITAL POWER DOWN HIGH
11	TST1	I	TEST TERMINAL
12	TST2	I	TEST TERMINAL
13	TST3	I	TEST TERMINAL
14	L/R	I	INPUT CHANNEL SELECT
15	SCLK	I	CLOCK FOR SERIAL DATA OUTPUT
16	SDATA	O	SERIAL DATA OUTPUT
17	VD1 +	—	+5V (DIGITAL)
18	VD2 +	—	+5V (DIGITAL)
19	DGND	—	DIGITAL GND
20	DCLKA	I	DIGITAL SYSTEM CLOCK PIN
21	NC	—	NO CONNECTION
22	ACLKA	O	ANALOGUE SYSTEM CLOCK PIN
23	CLKIN	I	MASTER CLOCK PIN
24	LGND	—	DIGITAL GND
25	VL +	—	+5V (DIGITAL)
26	ZEROR	I	ZERO LEVEL INPUT (R CHANNEL)
27	AINR	I	ANALOGUE INPUT (R CHANNEL)
28	VREF	O	REFERENCE VOLTAGE (-3.68V)



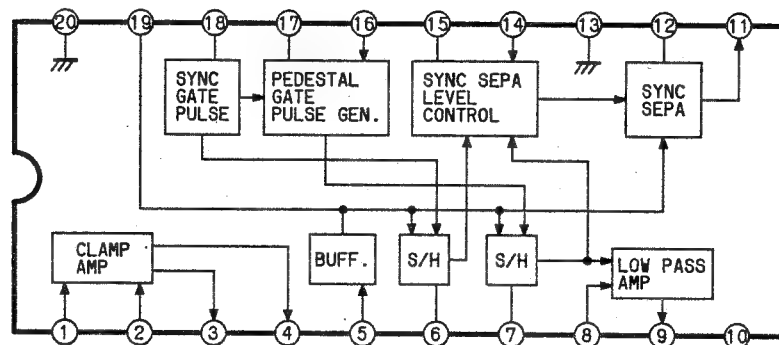
AN3834K
(REEL MOTOR DRIVE IC)



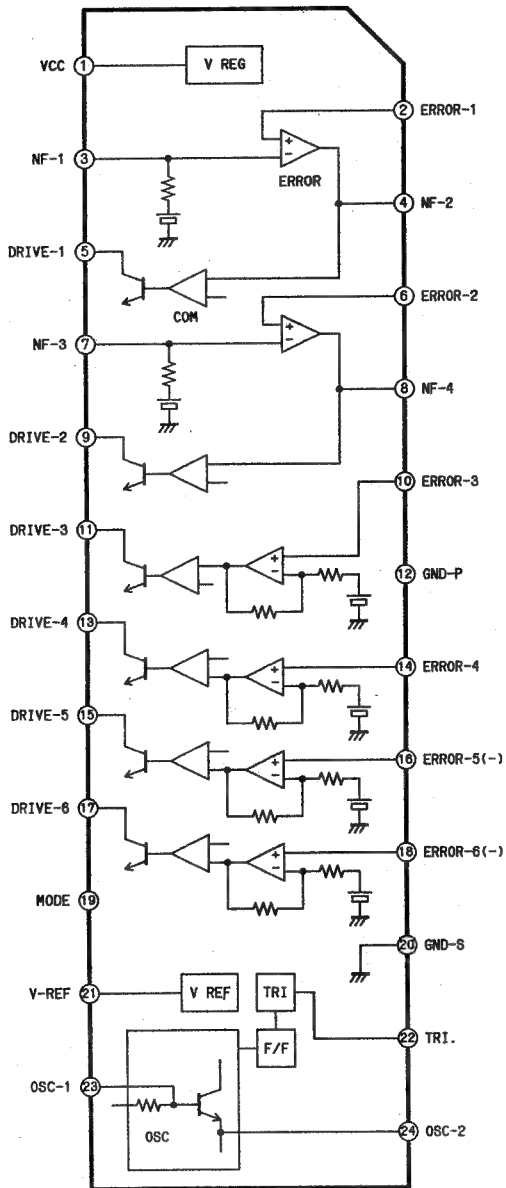
TRUTH TABLE

PIN NO.	SYMBOL	DESCRIPTION	I/O	PIN NO.	SYMBOL	DESCRIPTION	I/O
1	A3	DRIVE OUTPUT 3	O	13	VCC	POWER SUPPLY TERMINAL	I
2	ATC	ALL OUTPUT CURRENT	O	14	VH+	HALL ELEMENT POWER OUTPUT	O
3	A2	DRIVE OUTPUT 2	O	15	ED	DIRECTION COMMAND INPUT TERMINAL	I
4	VS	SWITCHING POWER SUPPLY CONTROL OUTPUT	O	16	ET	TORQUE COMMAND INPUT	I
5	H3-	HALL ELEMENT	I	17	TL	TORQUE LIMIT	I
6	H3+	HALL ELEMENT	I	18	PCI	CURRENT FEEDBACK PHASE COMPENSATION	I
7	H2-	HALL ELEMENT	I	19	DS	DISABLE INPUT	I
8	H2+	HALL ELEMENT	I	20	GND	GROUND	I
9	H1-	HALL ELEMENT	I	21	PCV	VOLTAGE FEEDBACK PHASE COMPENSATION	I
10	H1+	HALL ELEMENT	I	22	CS	CURRENT DETECT TERMINAL	I
11	PFG	--	O	23	A1	DRIVE OUTPUT 1	O
12	PCH	HALL AMPLIFIER PHASE COMPENSATION	I	24	VM	MOTOR POWER TERMINAL	I

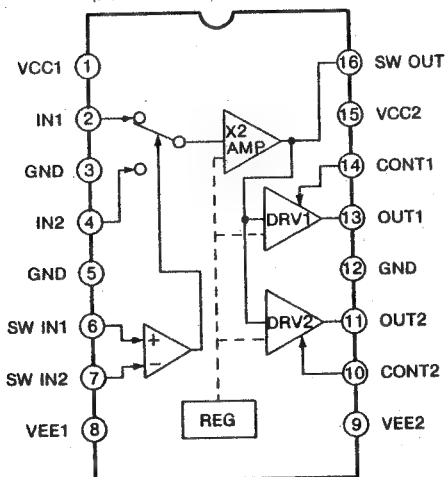
AN91A12S
(SYNC SEPARATOR)



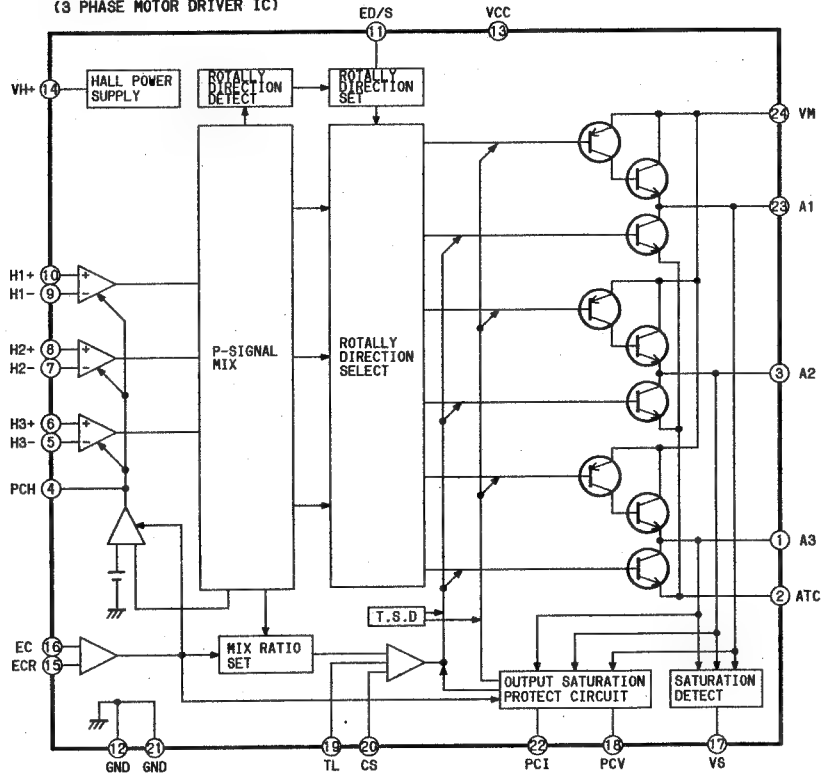
BA6149LS
(SWITCHING REGULATOR)



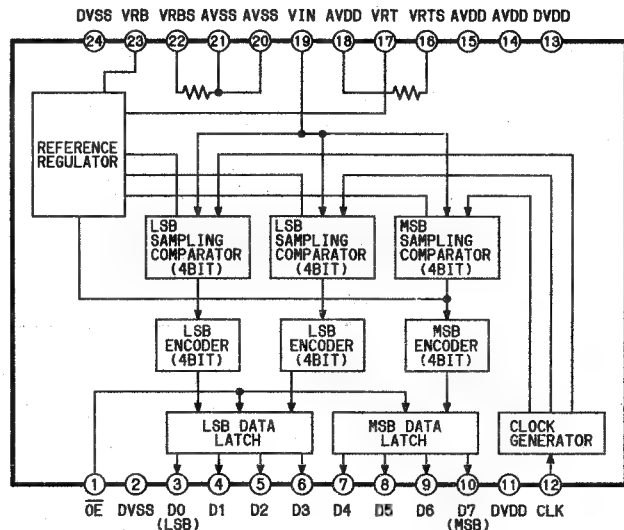
CXA1451M
(VTR SW & DRIVER)



BA6435S
(3 PHASE MOTOR DRIVER IC)

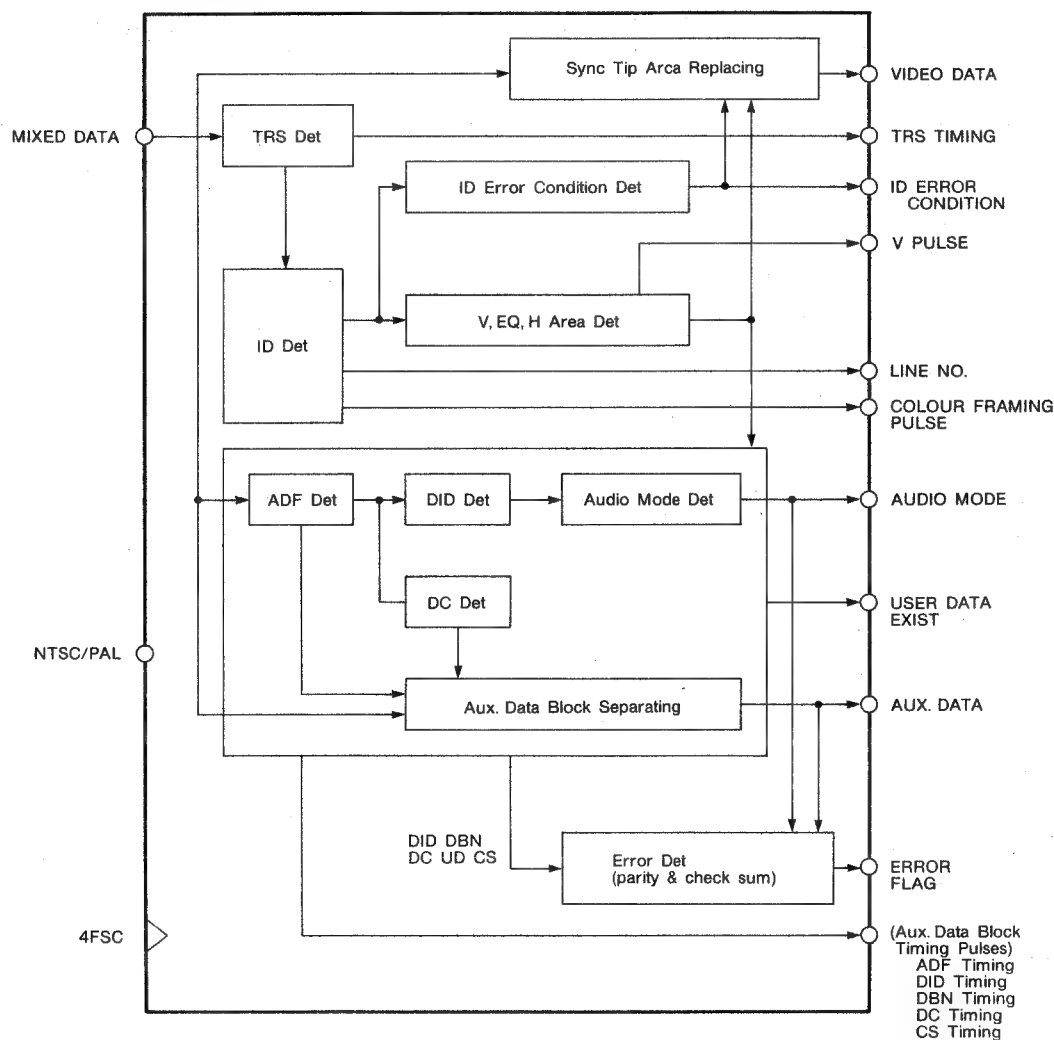


CXD1175AM
(8BIT 20MSPS VIDEO A/D CONVERTER)



CXD8129K

(CO-PROCESSOR OF THE SERIAL INTERFACE RECEIVER)



CXD-8129K

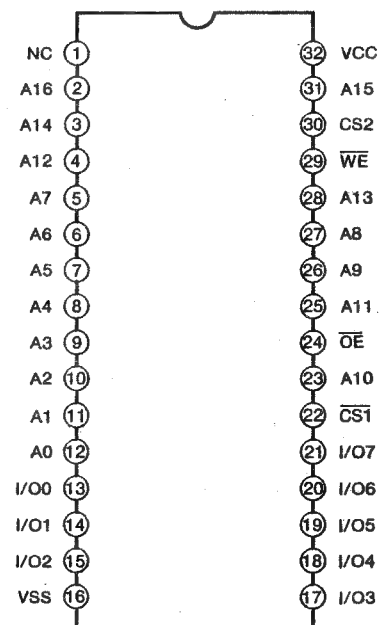
PIN NO.	I/O	PIN NAME	PIN NO.	I/O	PIN NAME	PIN NO.	I/O	PIN NAME	PIN NO.	I/O	PIN NAME
1	—	Vss	18	—	Vdd	35	—	Vss	52	—	Vdd
2	O	VID4	19	—	Vss	36	O	AUX8	53	—	Vss
3	O	VID3	20	I	4FSC	37	O	UDEXIST	54	O	TRSTMG
4	O	VID2	21	I	*O1P	38	O	ERROR	55	O	CF2
5	O	VID1	22	O	ADFTMG	39	I	MD0	56	O	CF1
6	O	VID0	23	O	DBNTMG	40	I	MD1	57	O	CF0
7	I	*RJNSEL1	24	O	DIDTMG	41	I	MD2	58	O	VPULSE
8	I	*RJNSEL0	25	I	*CY1H	42	I	MD3	59	I	MD9
9	I	*OEPOLSEL	26	I	*CY1L	43	I	MD4	60	I	MD8
10	I	HPLN	27	O	AUX0	44	O	LNO4	61	I	MD7
11	I	*CYH1L2	28	O	AUX1	45	O	LNO3	62	I	MD6
12	O	AUDMD	29	O	AUX2	46	O	LNO2	63	I	MD5
13	O	*TO1	30	O	AUX3	47	O	LNO1	64	O	VID9
14	O	*TO2	31	O	AUX4	48	O	LNO0	65	O	VID8
15	O	IDCND	32	O	AUX5	49	I	*TM1	66	O	VID7
16	O	CSTMG	33	O	AUX6	50	I	*TM0	67	O	VID6
17	O	DCTMG	34	O	AUX7	51	I	*RESET	68	O	VID5

*are used for device test

Vdd = 5V
Vss = GND

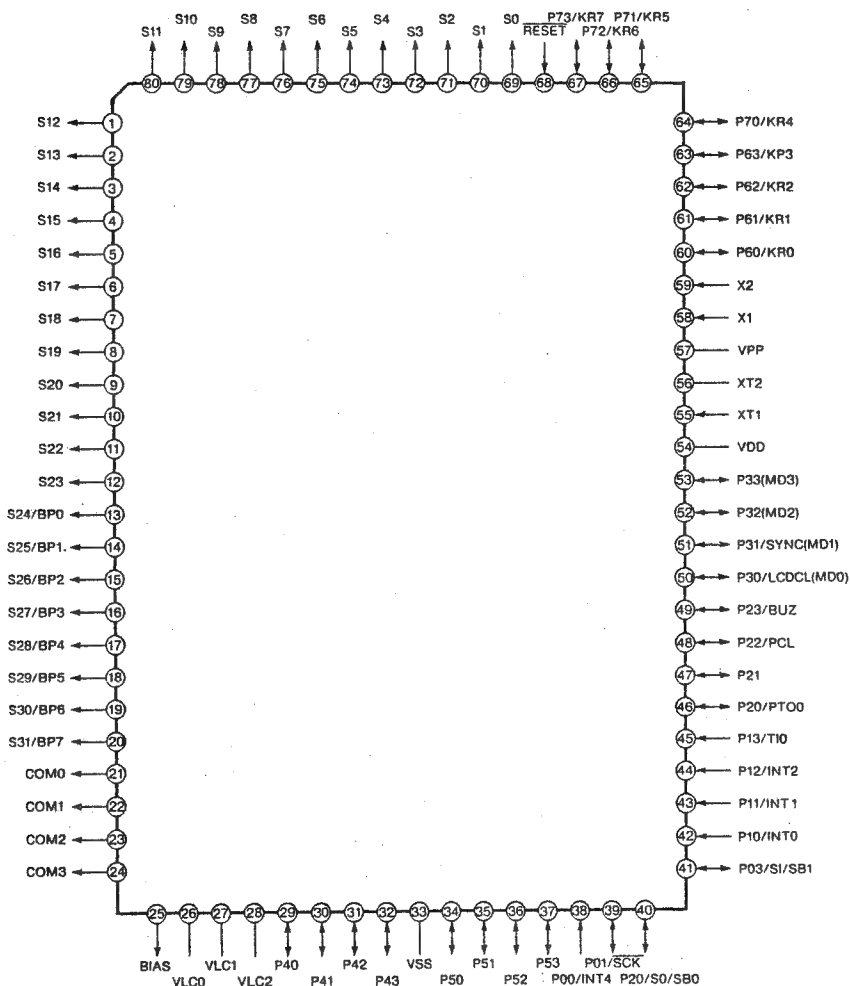
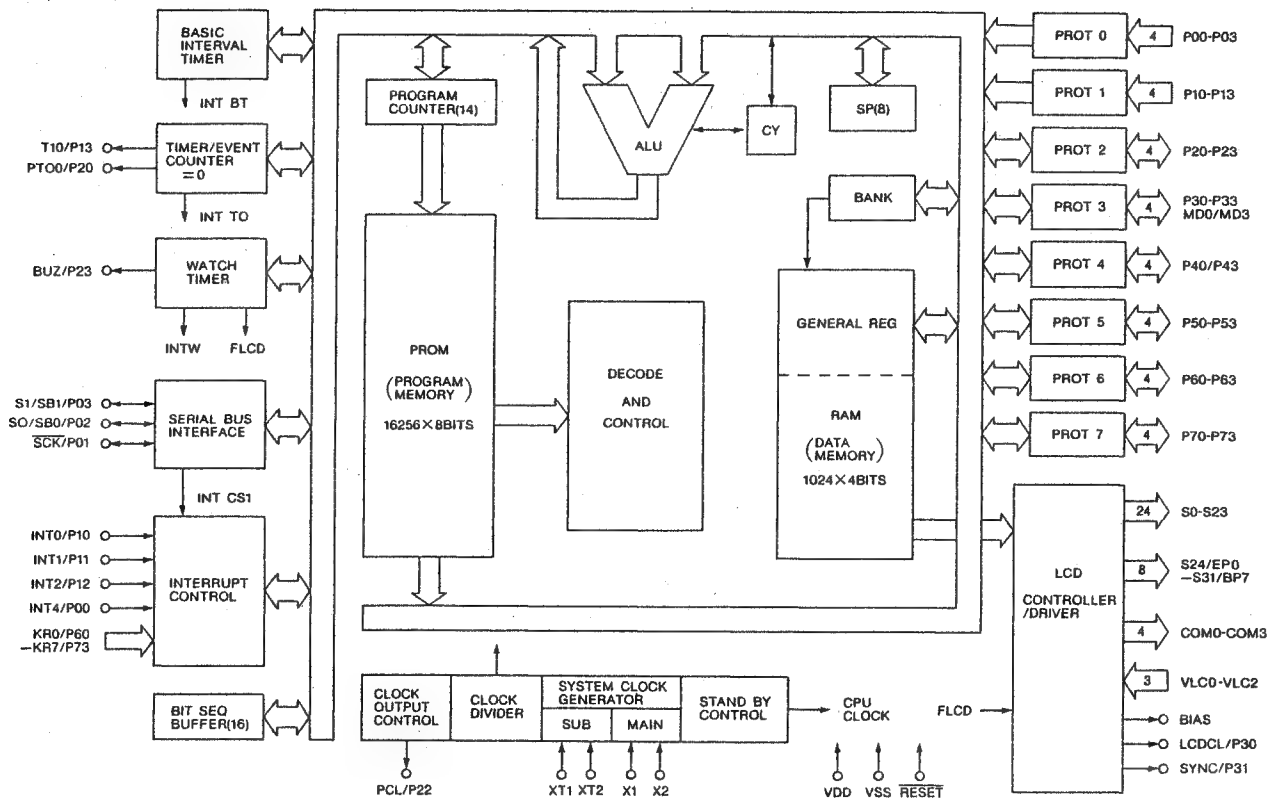
HM628128LFP7

(131.072×8BIT S-RAM)



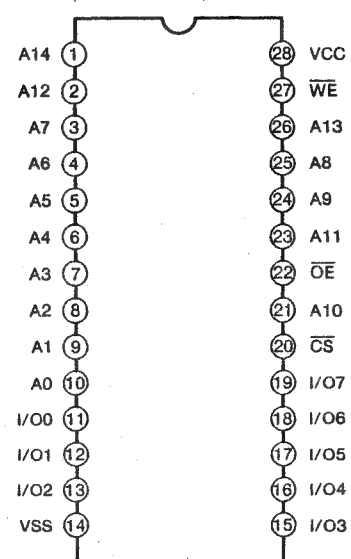
D75P316AGF

(4 BIT CPU)



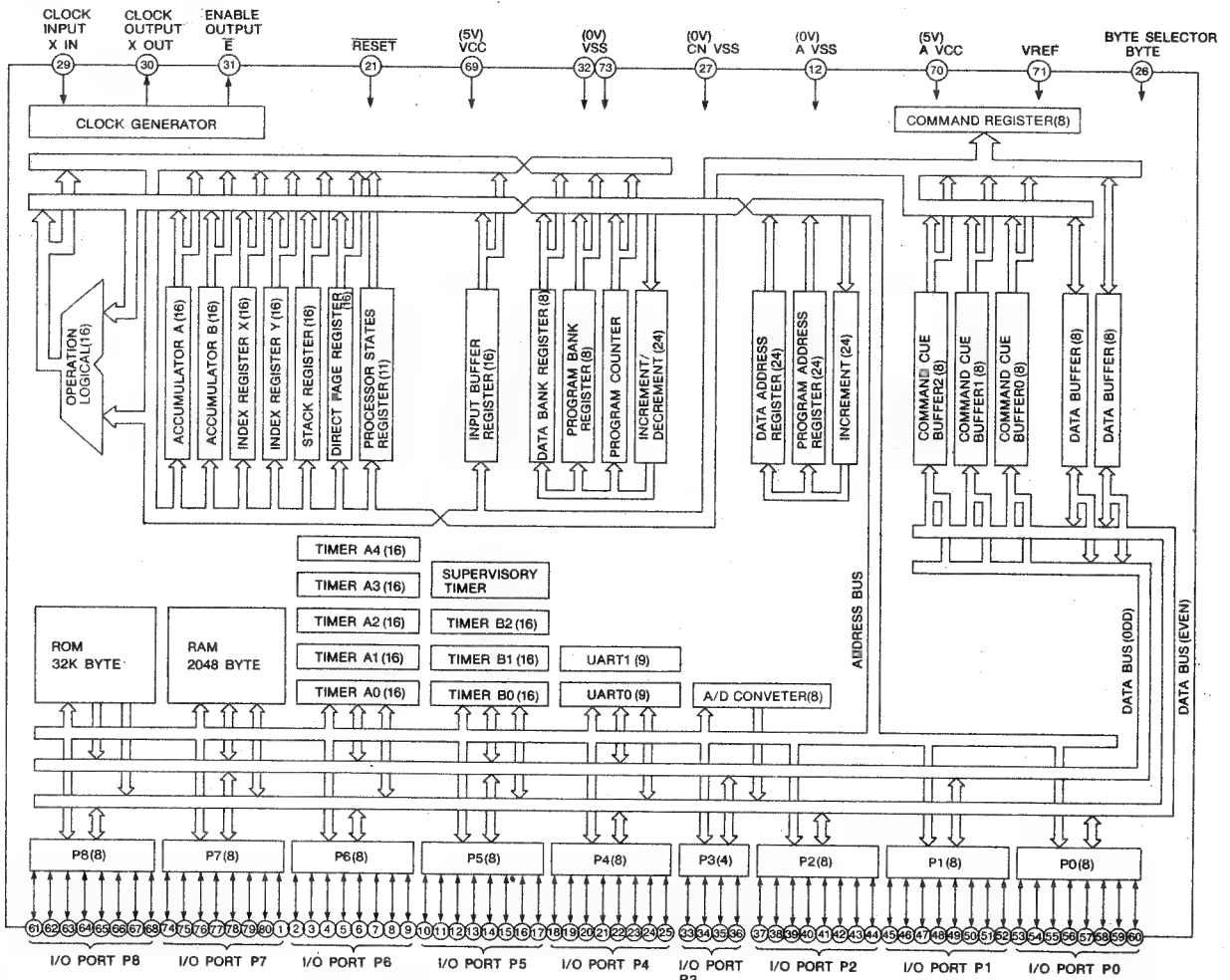
HM62832HJP35

(32,768x8BIT S-RAM)



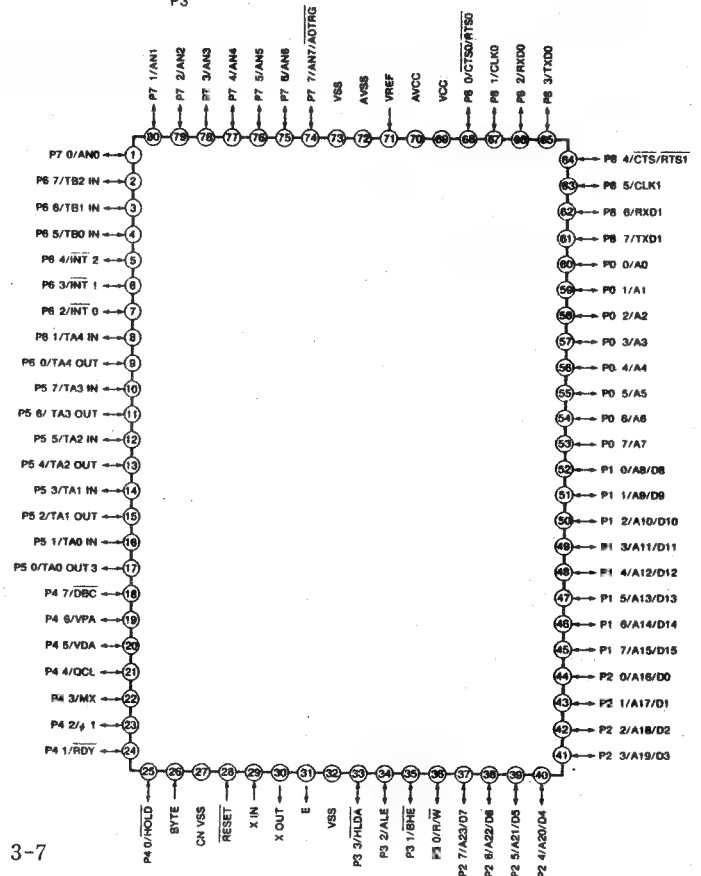
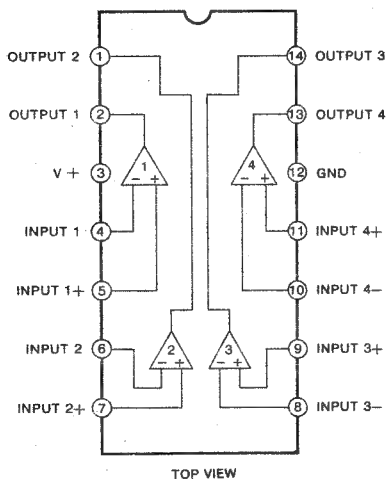
M37700S4FP

(16 BIT CPU)

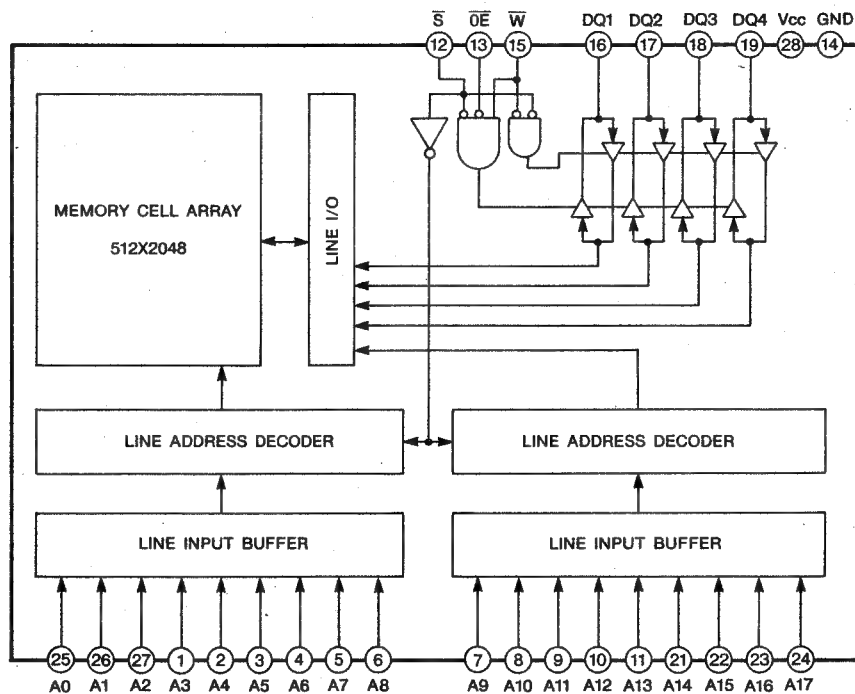
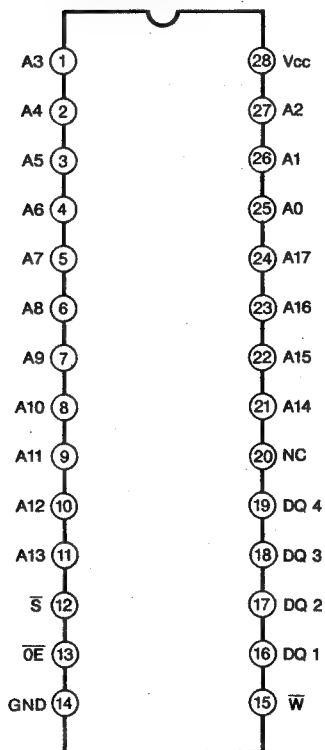


LM339DB

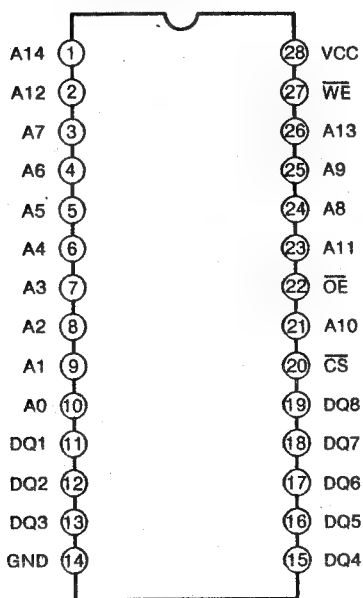
(QUAD COMPARATOR)



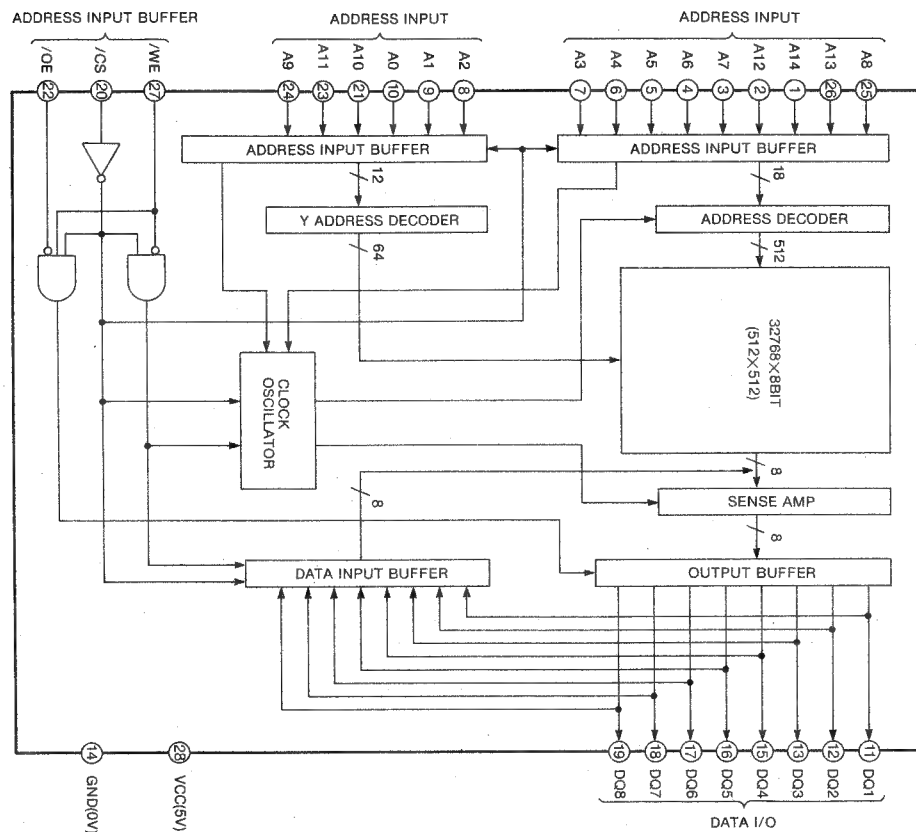
M51004J-35T4
(262144×8BIT CMOS S-RAM)

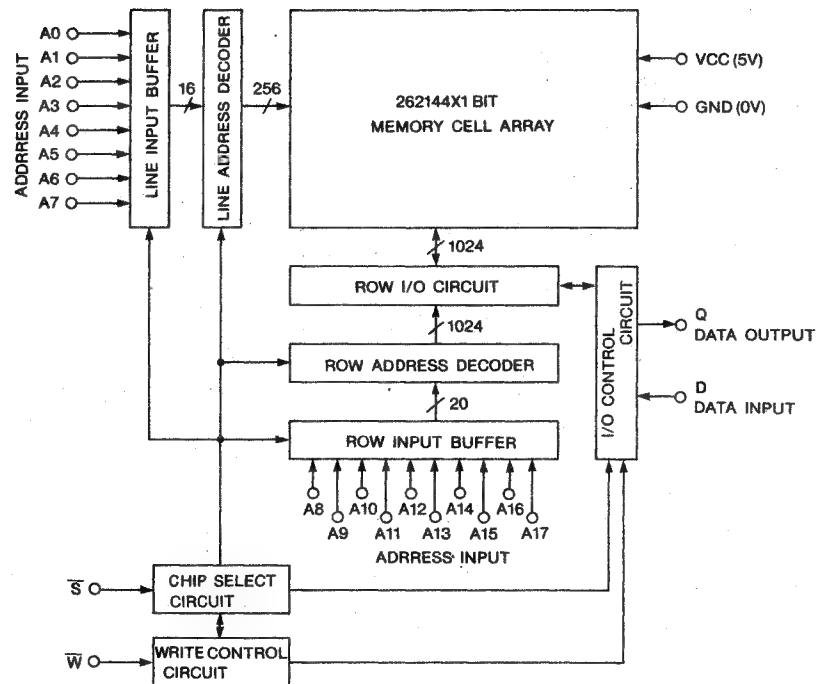
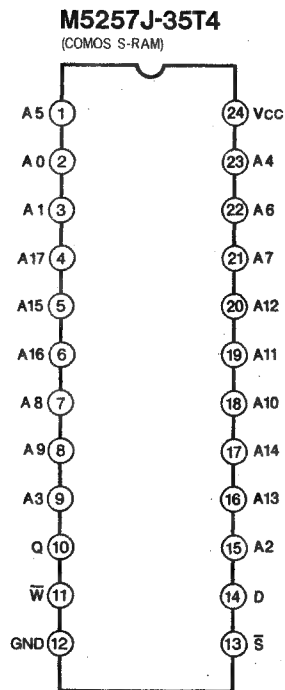


M5256BFP-70
(32768×8 BIT S-RAM)

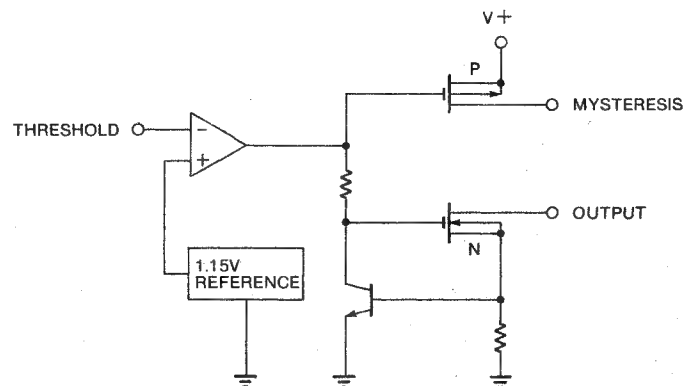
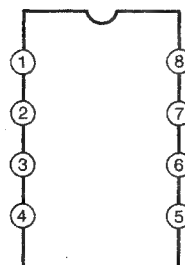


/WE=WRITE CONTROL
/CS=CHIP SELECT
/OE=OUTPUT CONTROL
DQ=DATA I/O

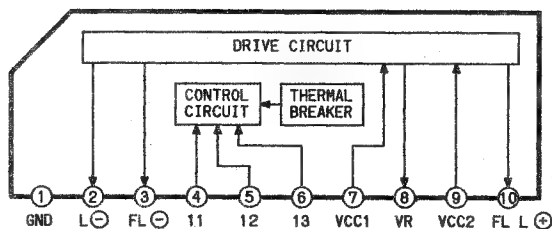




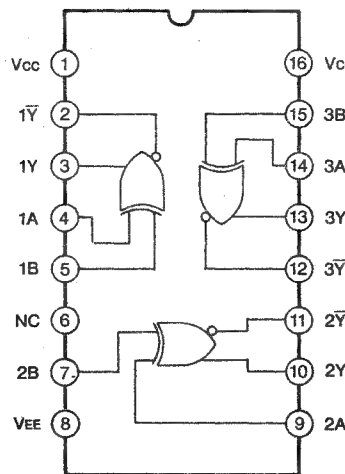
MAX8211CSA
(VOLTAGE DETECTOR)



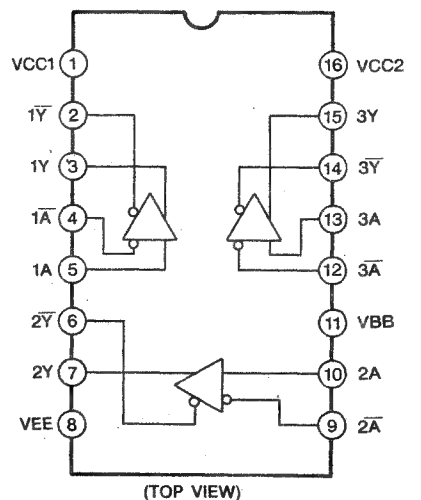
M54649L

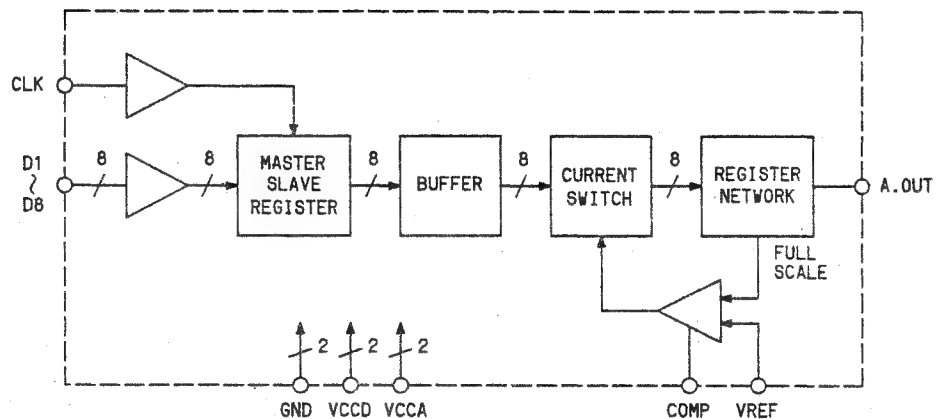
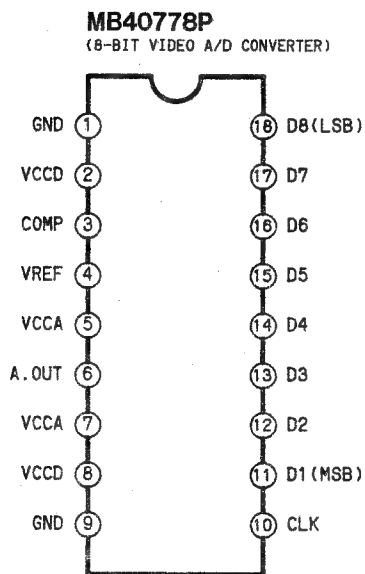
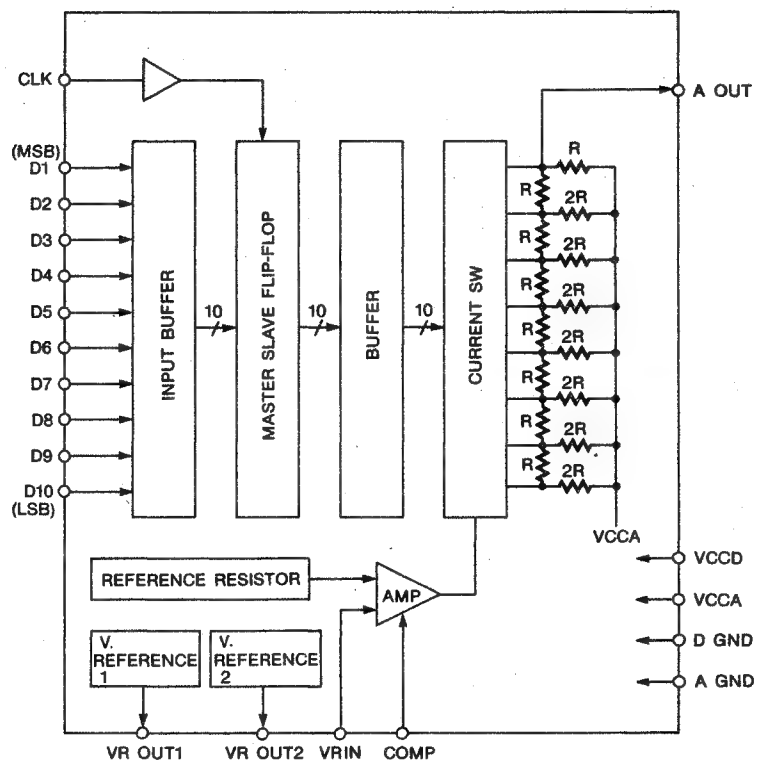
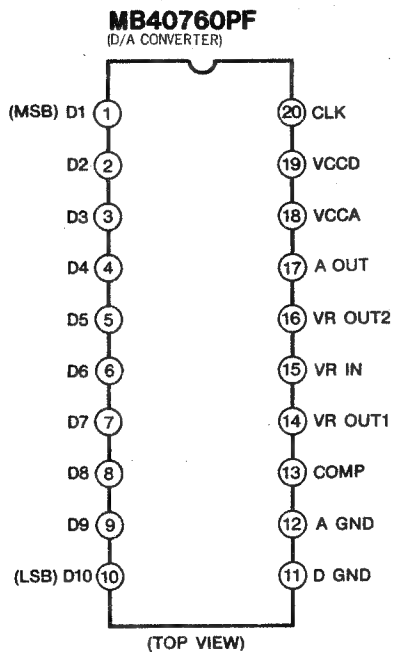


MB10HL107PFF
(TRIPLE EXCLUSIVE OR/ONR GATE)

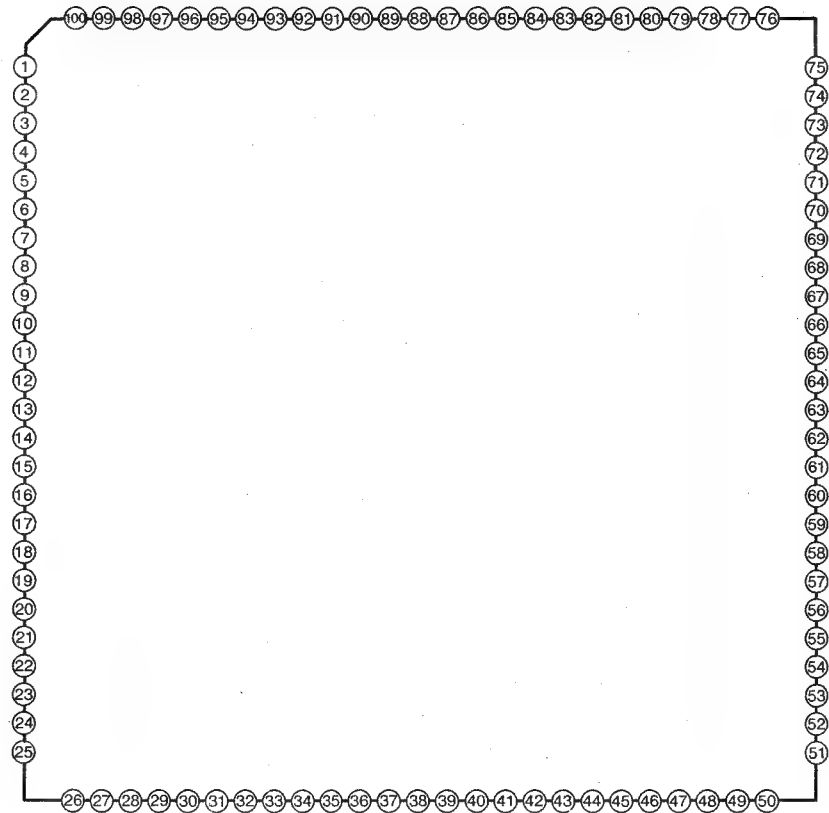


MB10HL116PFF
(TRIPLE LINE RECEIVER)





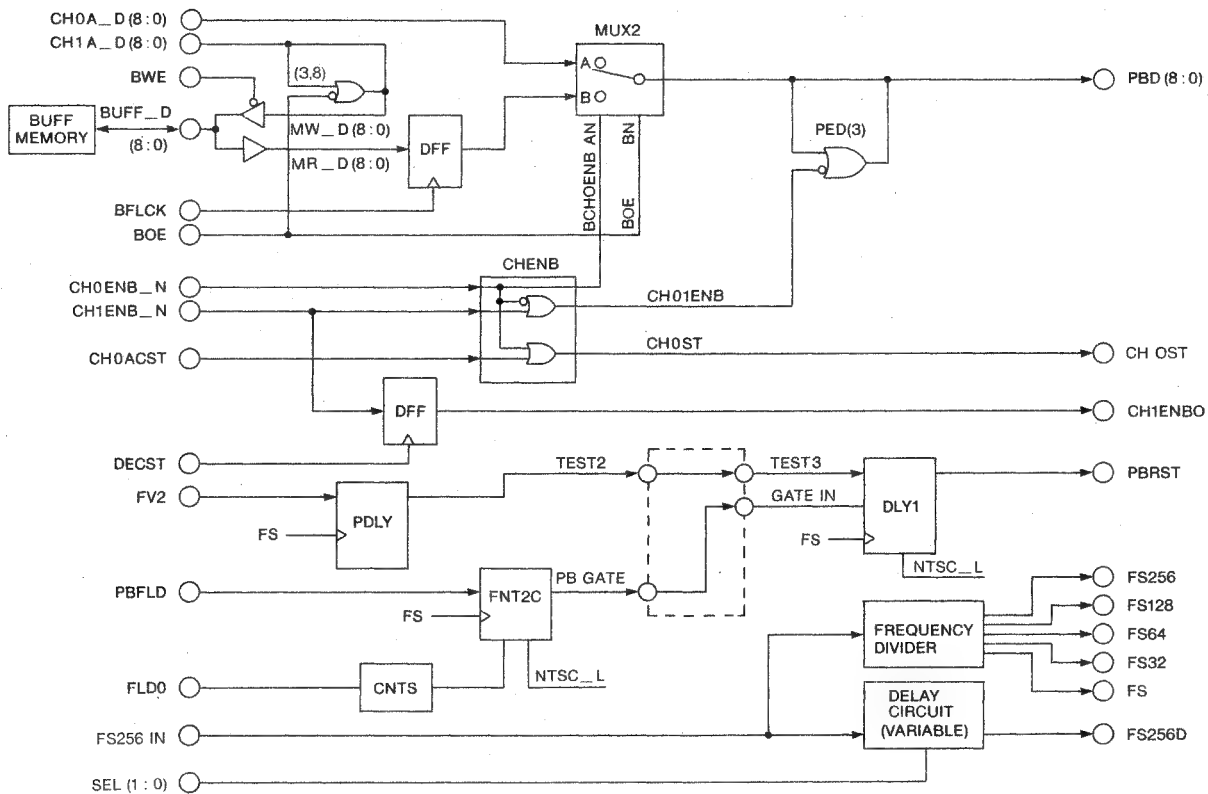
MB620859PFV
(PCM DATA PIN ARRANGEMENT)



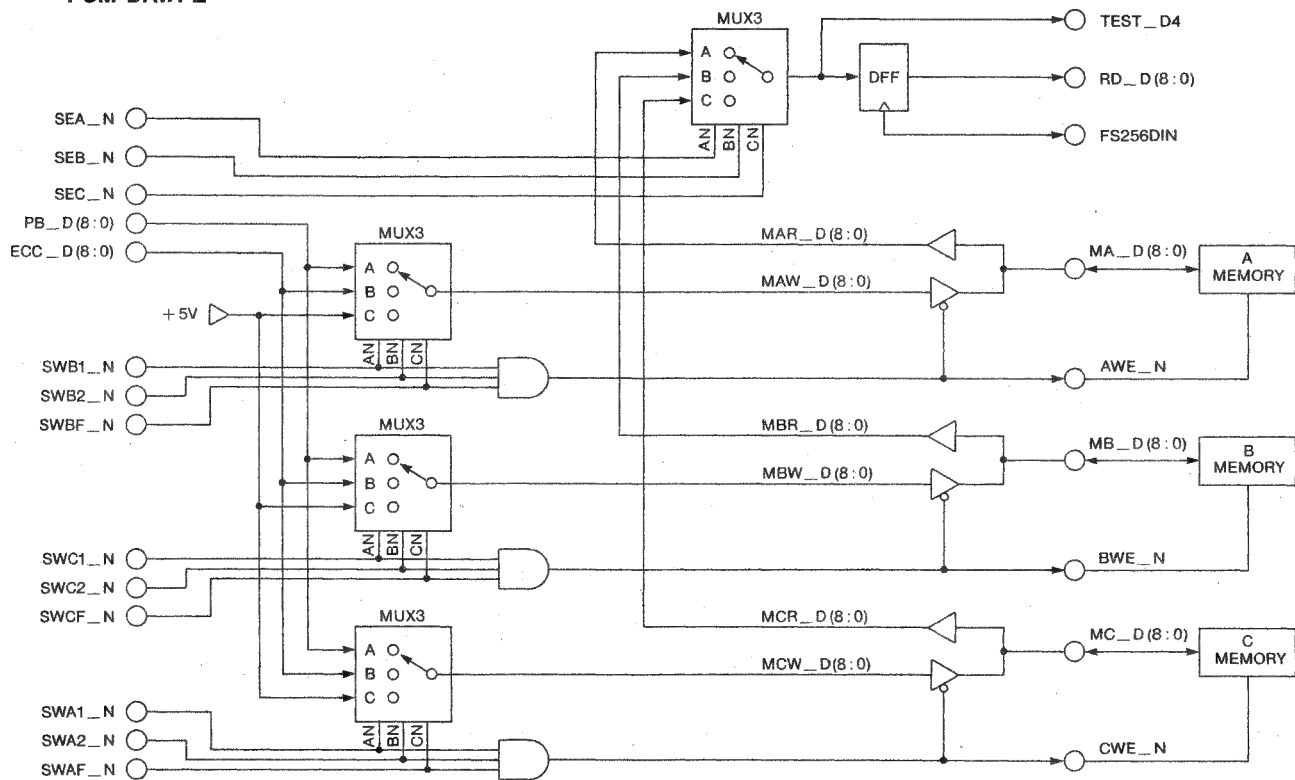
	DATA 1	DATA 2		DATA 1	DATA 2		DATA 1	DATA 2		DATA 1	DATA 2
1	CH0A_D0	PB_D0	26	CH1A_D4	ECC_D4	51	EPLOT	SWA2_N	76	TEST2	MB_D7
2	CH0A_D1	PB_D1	27	CH1A_D5	ECC_D5	52	BUFF_D0	MA_D0	77	RSRVD3	MB_D8
3	VDD	VDD	28	VDD	VDD	53	VDD	VDD	78	VDD	VDD
4	VSS	VSS	29	VSS	VSS	54	VSS	VSS	79	VSS	VSS
5	CH0A_D2	PB_D2	30	CH1A_D6	ECC_D6	55	BUFF_D1	MA_D1	80	TEST3	SWB1_N
6	CH0A_D3	PB_D3	31	CH1A_D7	ECC_D7	56	BUFF_D2	MA_D2	81	GATELN	SWB2_N
7	CH0A_D4	PB_D4	32	CH1A_D8	ECC_D8	57	BUFF_D3	MA_D3	82	BFLCK	SWBF_N
8	CH0A_D5	PB_D5	33	PBD0	RD_D0	58	BUFF_D4	MA_D4	83	BOE	SWC1_N
9	CH0A_D6	PB_D6	34	PBD1	RD_D1	59	BUFF_D5	MA_D5	84	BWE	SWC2_N
10	CH0A_D7	PB_D7	35	PBD2	RD_D2	60	BUFF_D6	MA_D6	85	FLB0	SWCF_N
11	CH0A_D8	PB_D8	36	PBD3	RD_D3	61	BUFF_D7	MA_D7	86	PBFLD	RSRVD12
12	CH0END_N	RSRVD1	37	PBD4	RD_D4	62	BUFF_D8	MA_D8	87	CLK_LN1	FS256DIN
13	CH1END_N	RSRVD2	38	PBD5	RD_D5	63	AWE_N	AWE_N	88	FS256IN	RSRVD13
14	CH0CST	RSRVD3	39	PBD6	RD_D6	64	BWE_N	BWE_N	89	OE	OE
15	VSS	VSS	40	VSS	VSS	65	VSS	VSS	90	VSS	VSS
16	FV2	RSRVD4	41	PBD7	RD_D7	66	CWE_N	CWE_N	91	MODE_SEL	MOOE_SEL
17	FS	RSRVD5	42	PBD8	RD_D8	67	TEST_D4	TEST_D4	92	CLK_OUT1	MC_D0
18	EE_PB	RSRVD6	43	SEL0	RSRVDL0	68	BP_N	BP_N	93	CLK_OUT2	MC_D1
19	AREC	RSRVD7	44	SEL1	RSRVDL1	69	RSRVD1	MB_D0	94	FS256D	MC_D2
20	JVSHT	RSRVD8	45	SEL2	SEA_N	70	RSRVD2	MB_D1	95	FS128	MC_D3
21	NTSC_1	RSRVD9	46	SEL3	SEB_N	71	CH0ST	MB_D2	96	FS64	MC_D4
22	CH1A_D0	ECC_D0	47	SEL4	SEC_N	72	CH1ENDO	MB_D3	97	FS32	MC_D5
23	CH1A_D1	ECC_D1	48	DEGST	SWAL_N	73	PBRST	MB_D4	98	FS	MC_D6
24	CH1A_D2	ECC_D2	49	CLRN	CLRN	74	PBGATE	MB_D5	99	RSRVD4	MC_D7
25	CH1A_D3	ECC_D3	50	TEST4	SWAF_N	75	TEST1	MB_D6	100	RSRVD5	MC_D8

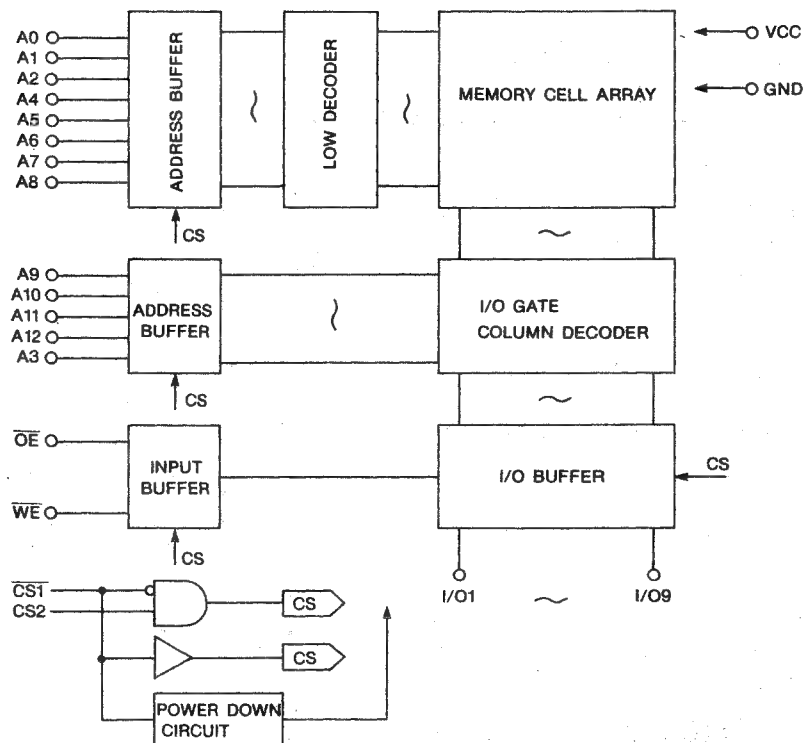
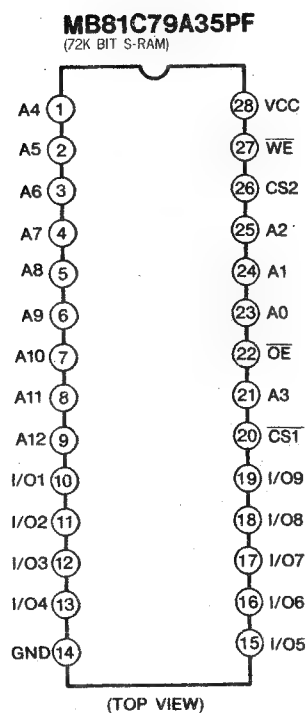
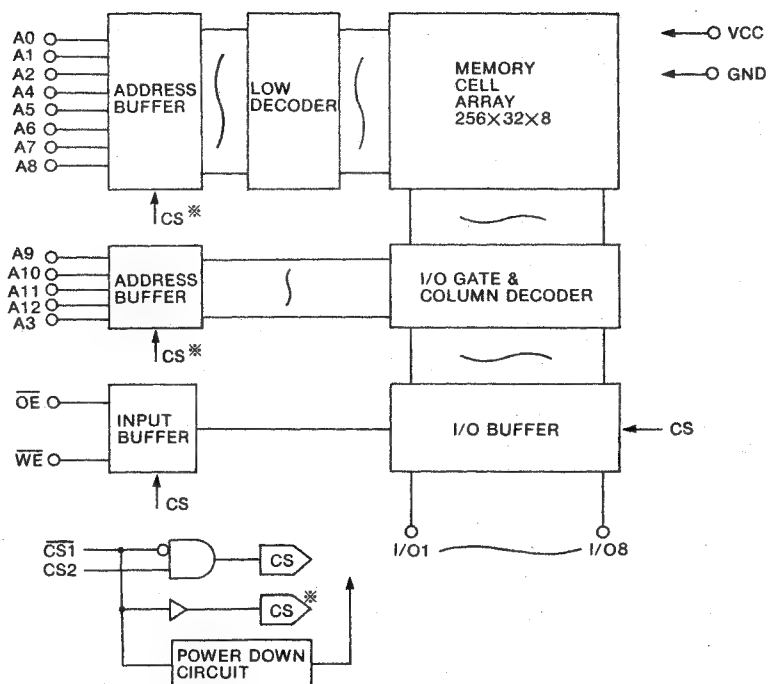
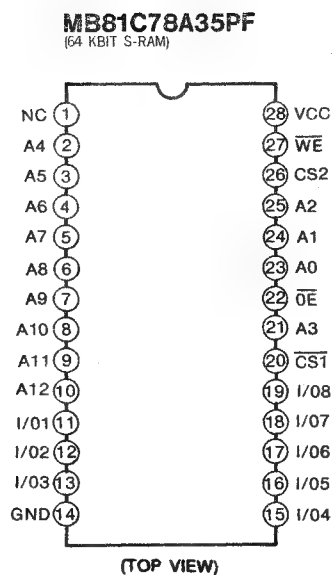
MB620859PFV

PCM DATA 1

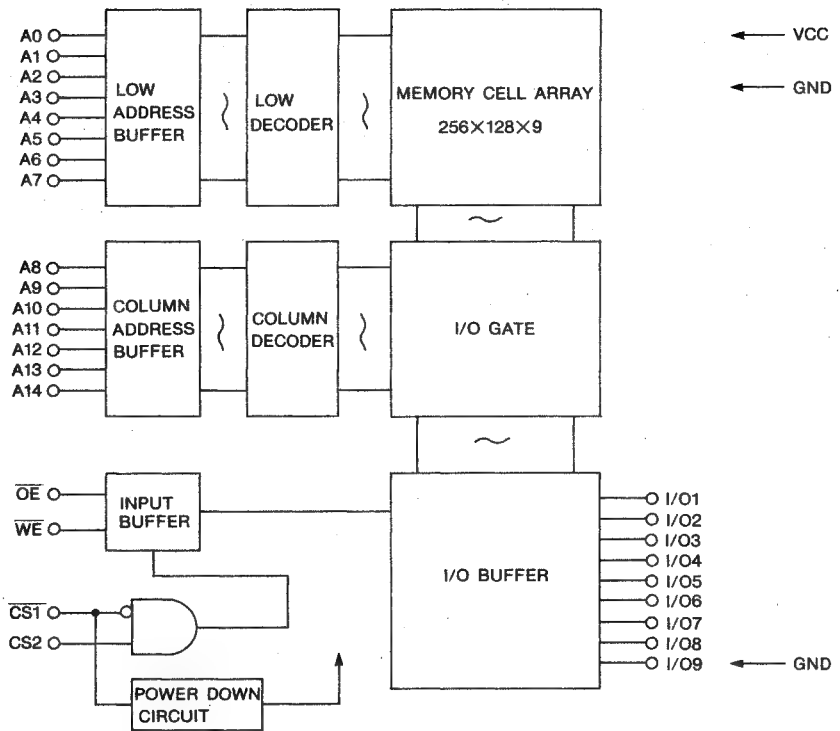
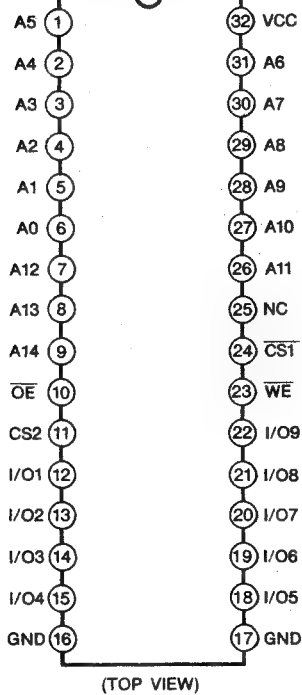


PCM DATA 2



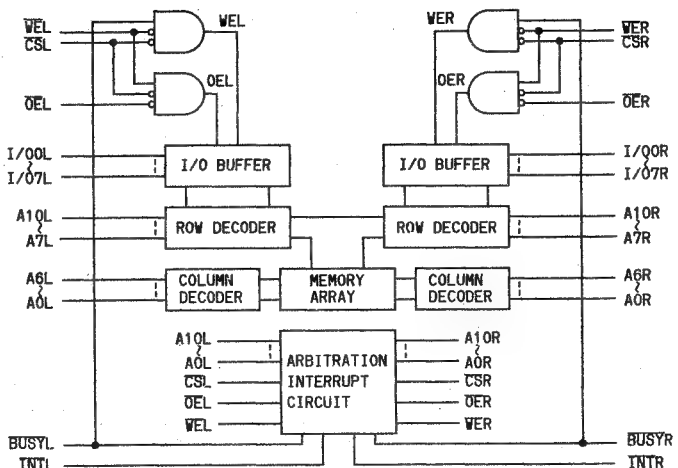
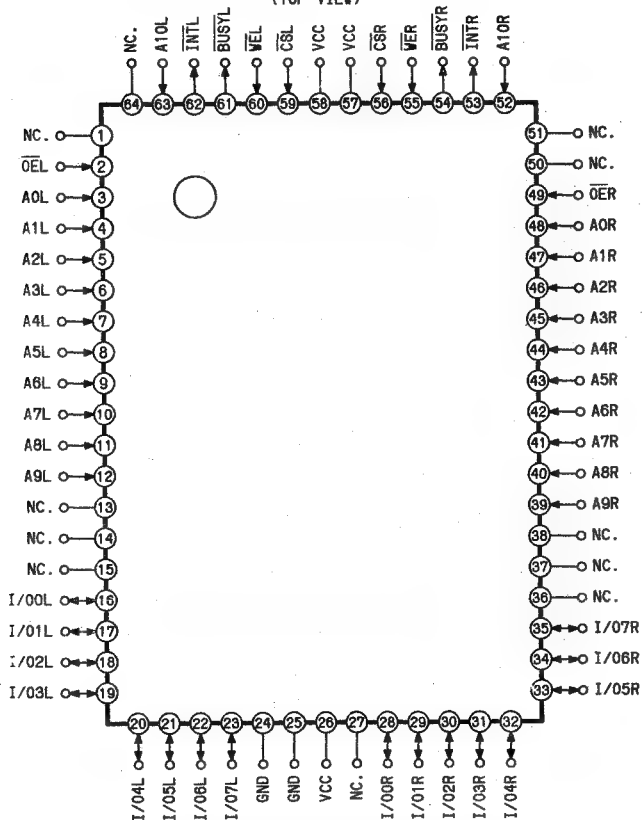


MB8289-25PF (288K BIT S-RAM)

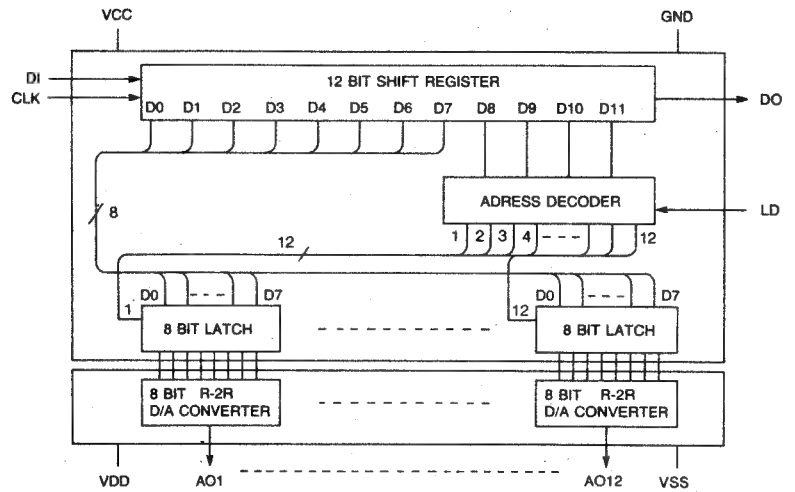
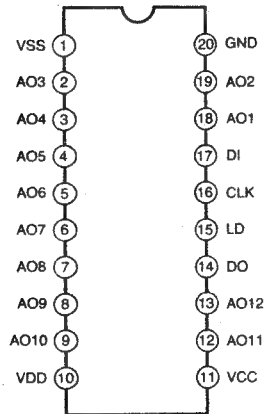


MB8421-90LPF (16K BIT DUAL PORT STATIC RAM)

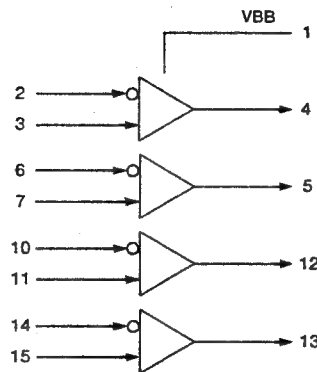
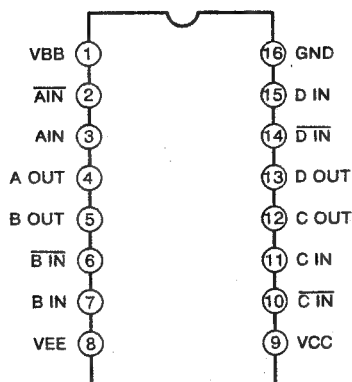
(TOP VIEW)



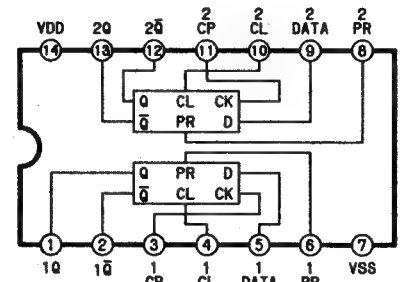
MB88341PF



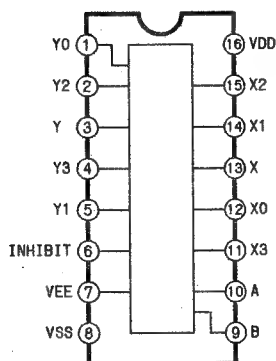
MC10125L (TRANSLATOR)



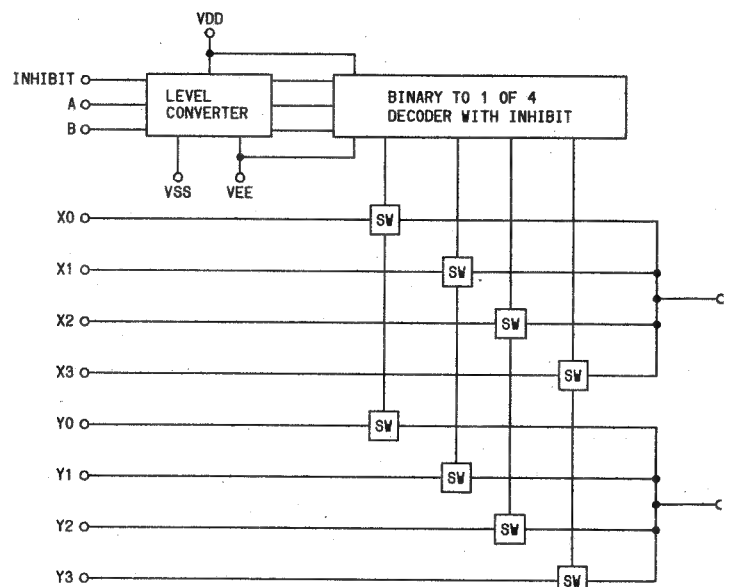
MC14013BF (DUAL D-TYPE FLIP-FLOP)



MC14052BF (DIFFERENTIAL 4-CHANNEL MULTIPLEXER/DEMULTIPLEXER) (TOP VIEW)

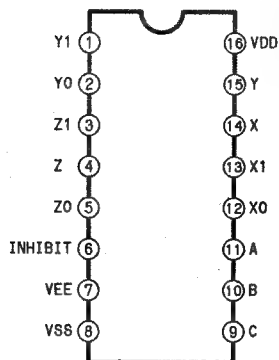


TRUTH TABLE			
INPUT STATES			"ON" CHANNEL(S)
INHIBIT	B	A	
0	0	0	X0, Y0
0	0	1	X1, Y1
0	1	0	X2, Y2
0	1	1	X3, Y3
1	X	X	NONE



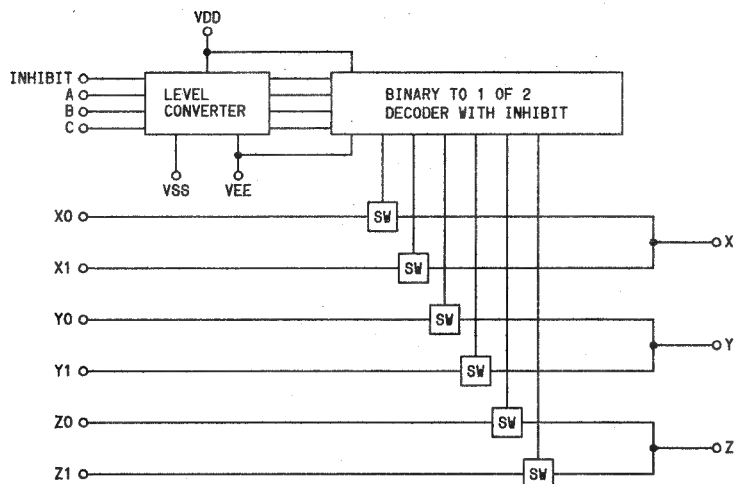
MC14053BF

(TRIPLE 2-CHANNEL
MULTIPLEXER/DEMULTIPLEXER)
(TOP VIEW)



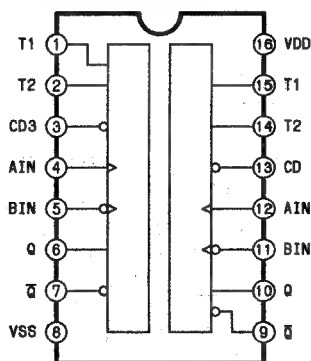
TRUTH TABLE

INPUT STATES				"ON" CHANNEL(S)
INHIBIT	C	B	A	
0	0	0	0	X0, Y0, Z0
0	0	0	1	X1, Y1, Z1
1	X	X	X	NONE



MC14538BF

(DUAL PRECISION
MONOSTABLE MULTIVIBRATOR)
(TOP VIEW)

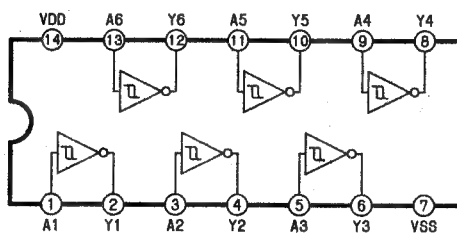


TRUTH TABLE

INPUT			OUTPUT	
A	B	CD	Q	Q-bar
L	H	H	L	H
L	H	L	H	L
H	L	H	L	H
H	L	L	H	L
X	X	L	L	H

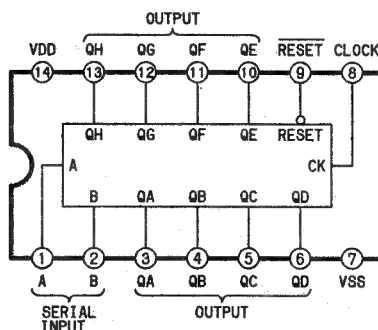
MC14584BF

(HEX. SCHMITT TRIGGER)
(TOP VIEW)

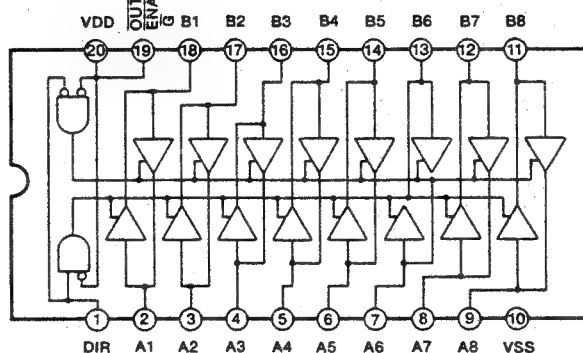


MC74H164F

(8-BIT SERIAL-IN/PARALLEL-OUT SHIFT REGISTER)
(TOP VIEW)

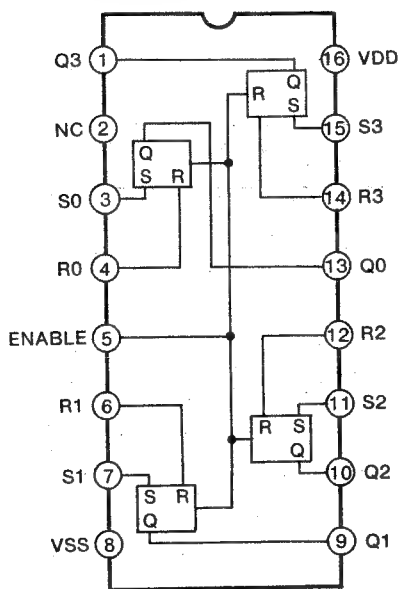


MC74HC245AF



MC4044M

(QUAD NAND RS LATCH)
(TOP VIEW)

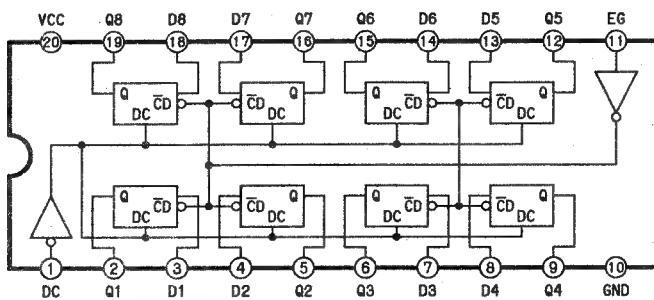


S	R	E	Q
X	X	0	HIGH IMPEPLANCE
0	0	1	0
0	1	1	1
1	0	1	0
1	1	1	NO CHANGE

X = DON'T CARE

MC74HC373F

(3-STATE OCTAL D-TYPE LATCH)

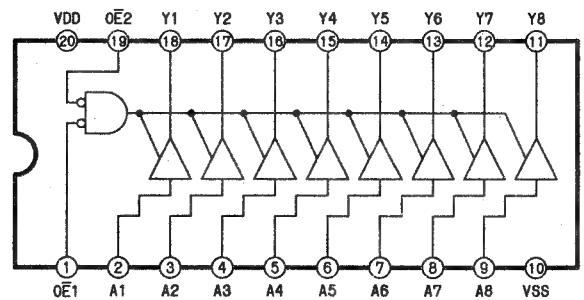


TRUTH TABLE (74HC373)

OUTPUT CONTROL DC	LATCH ENABLE EG	DATA	OUTPUT
L	H	H	H
L	H	L	L
L	L	X	Q0
H	X	X	Z

MC74HC541F

(OCTAL 3-STATE BUFFER) (TOP VIEW)



OE1, OE2: OUTPUT ENABLE

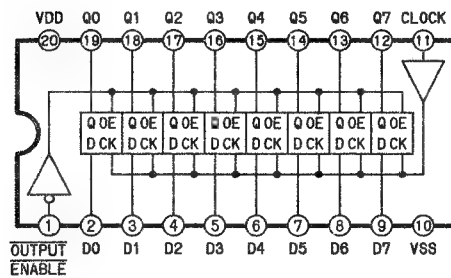
TRUTH TABLE

INPUT			OUTPUT
OE1	OE2	A	Y
L	L	L	L
L	L	H	H
H	X	X	Z
X	H	X	Z

X: H or L Z: HIGH IMPEDANCE

MC74HC574F

(OCTAL D-TYPE FLIP-FLOP) (TOP VIEW)



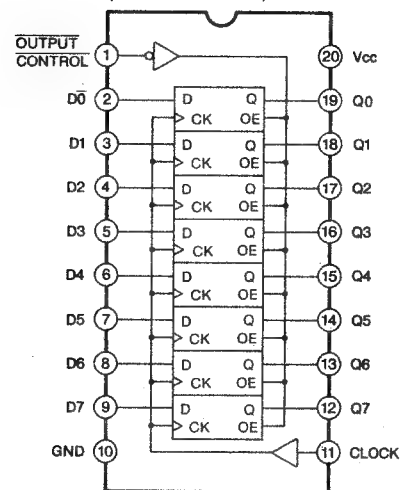
TRUTH TABLE (74HC574)

INPUT			OUTPUT
OUTPUT ENABLE	CLOCK	DATA D	Q
L	↗	H	H
L	↘	L	L
L	↗	X	NO CHANGE
H	X	X	Z

X: H or L Z: HIGH IMPEDANCE

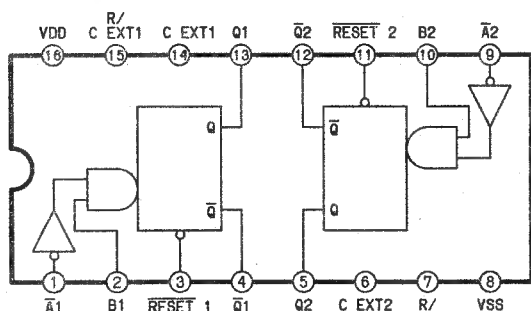
MC74HC574F

(OCTAL-3-STATE D-FFS)



MM74HC221AM

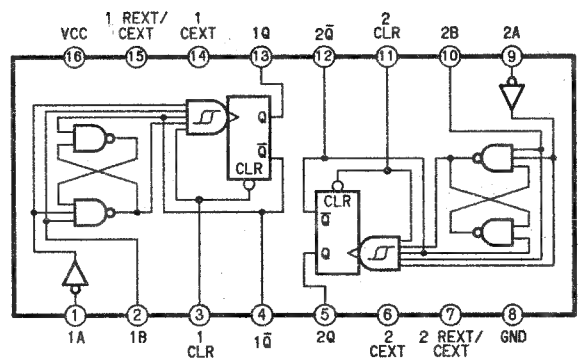
(DUAL NON-RETRIGGERABLE MONOSTABLE MULTIVIBRATOR) (TOP VIEW)



(74HC221)

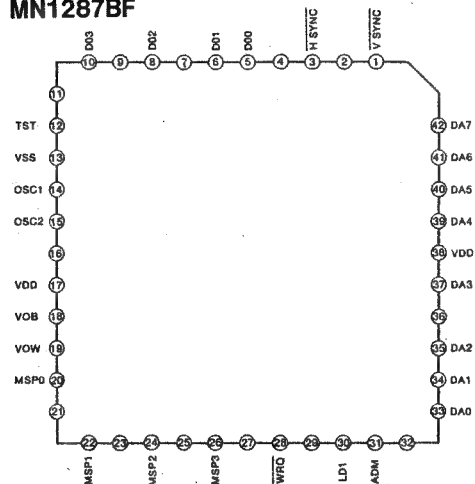
TRUTH TABLE (74HC221)

INPUTS			OUTPUTS	
CLEAR	A	B	Q	Q̄
L	X	X	L	H
X	H	X	L	H
X	X	L	L	H
H	L	↑	↗	↘
H	↓	H	↘	↗
↑	L	H	↗	↘



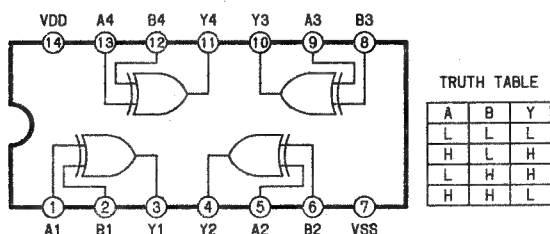
(74221)

MN1287BF



MN4030BS

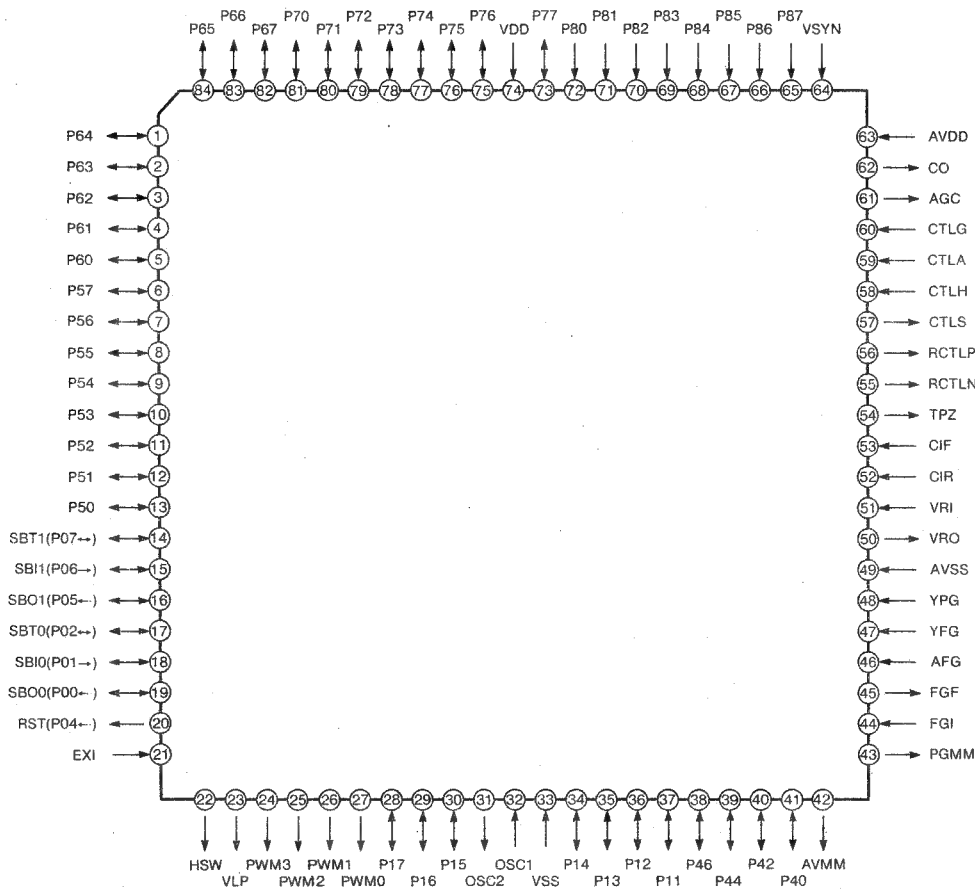
(QUAD EXCLUSIVE OR GATE)
(TOP VIEW)



MN67512VAVH2

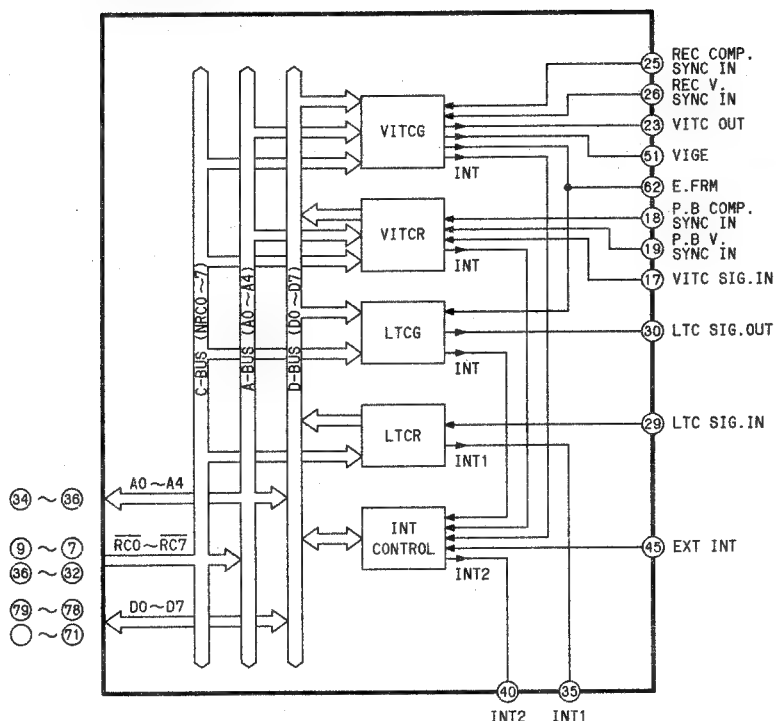
(MICROPROCESSOR FOR VTR SERVO)

(TOP VIEW)



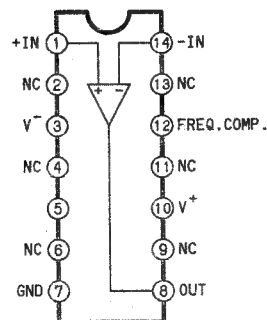
MN51040VPI

(TIME CODE GENERATOR/READER)



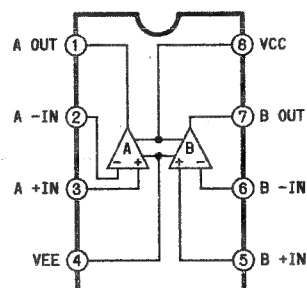
NE5539D

(ULTRA HIGH FREQUENCY)
(TOP VIEW)

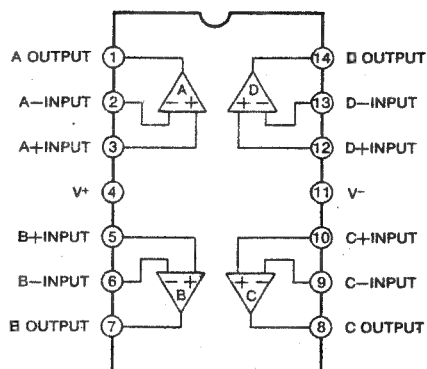


NJM062M

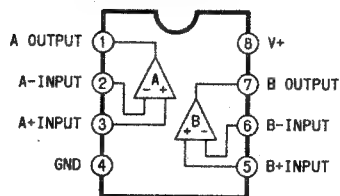
(OPERATIONAL AMPLIFIER)
(TOP VIEW)



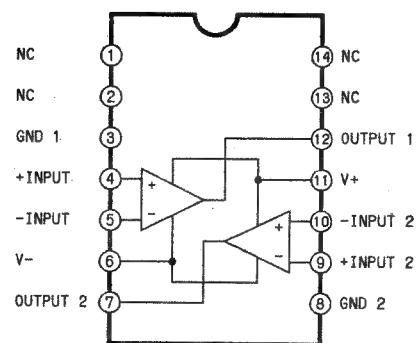
NJM064M
(OP AMP)



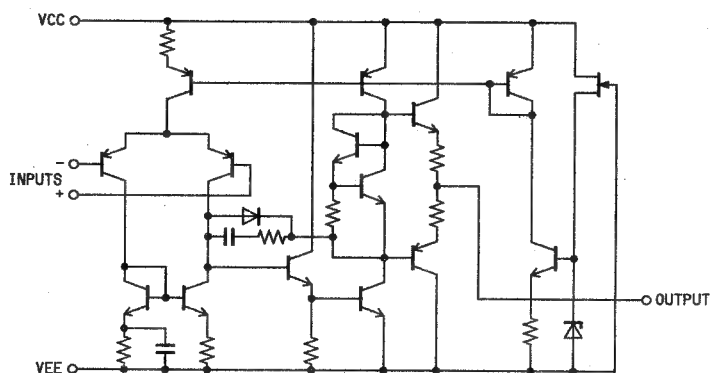
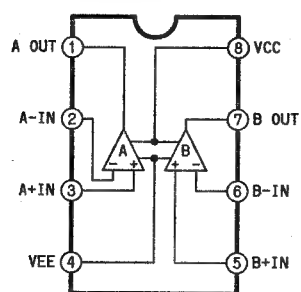
NJM2904M
(DUAL SIGNAL SUPPLY
OPERATIONAL AMPLIFIER)
(TOP VIEW)



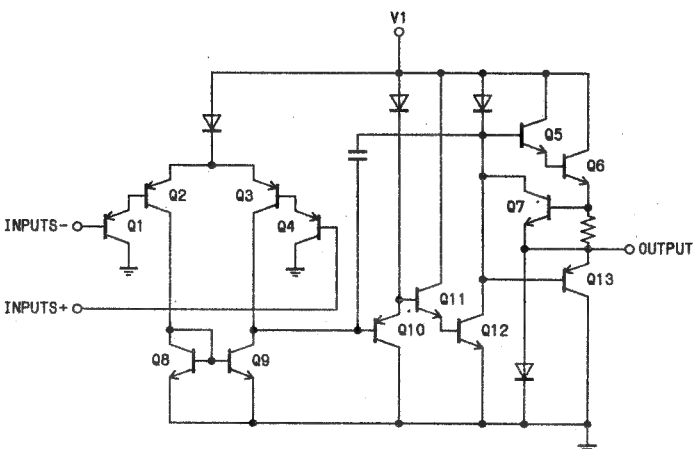
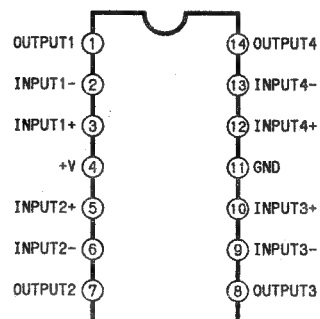
NJM319M
(DUAL VOLTAGE COMPARATOR)
(TOP VIEW)



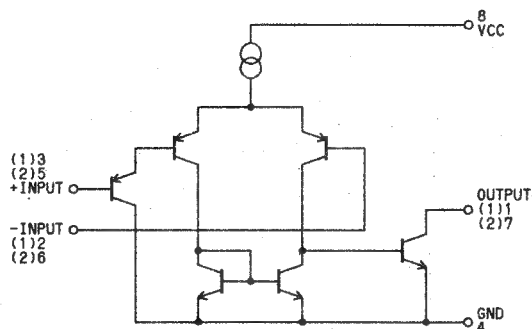
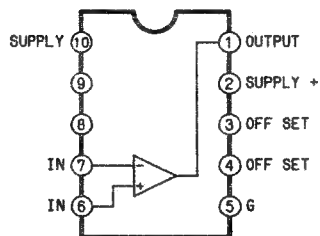
NJM2068MD
(OPERATIONAL AMPLIFIER)
(TOP VIEW)



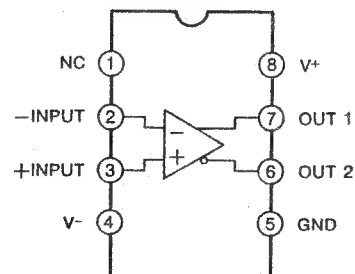
NJM2902M
(OPERATIONAL AMPLIFIER)
(TOP VIEW)



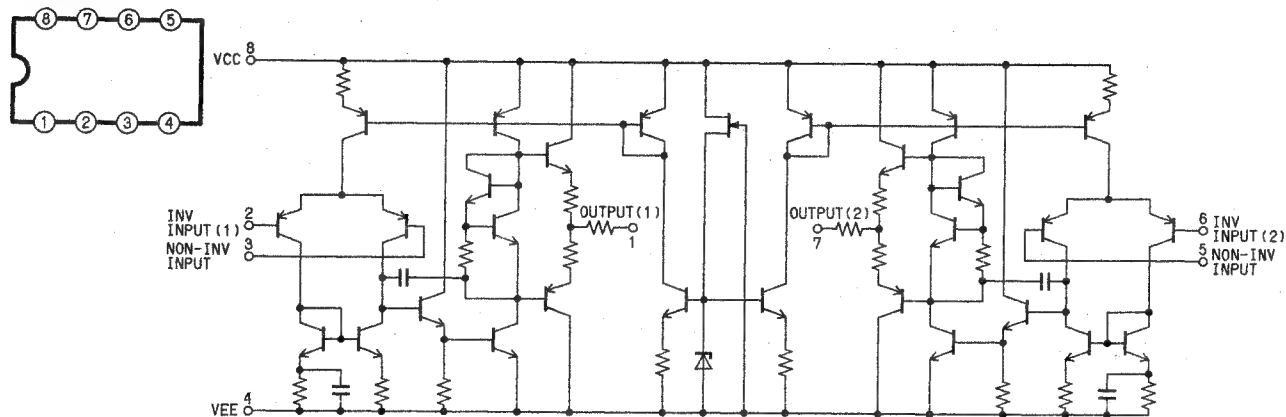
NJM2903M
(VOLTAGE COMPARATOR)
(TOP VIEW)



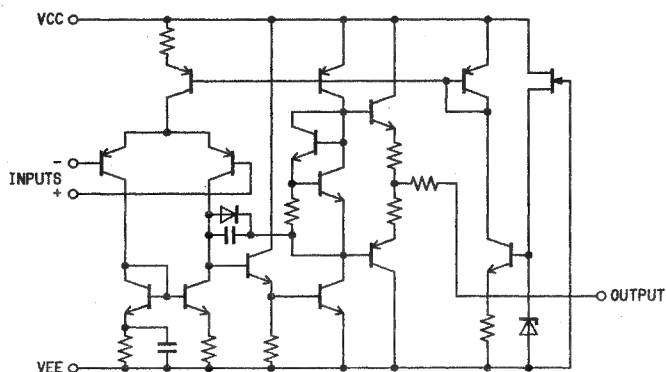
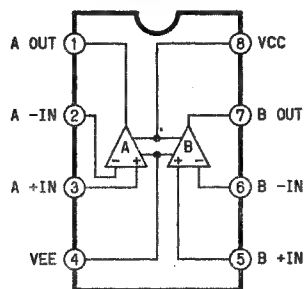
NJM360M
(OP AMP)



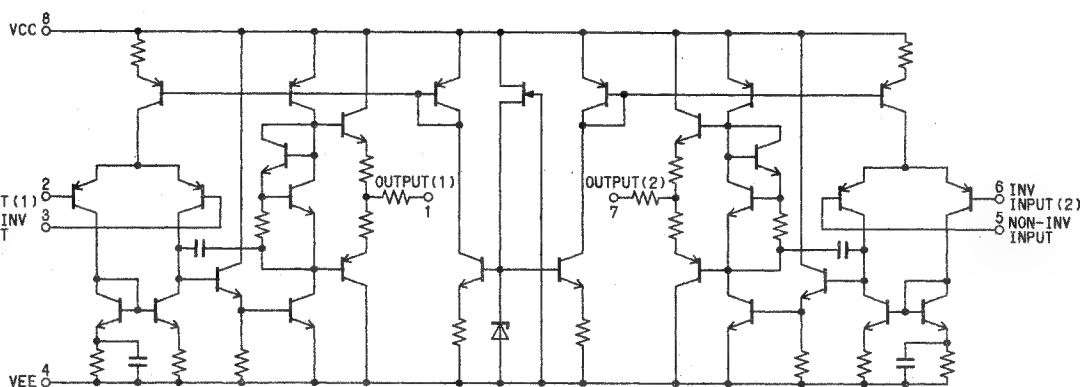
NJM4556MB
(OPERATIONAL AMPLIFIER)



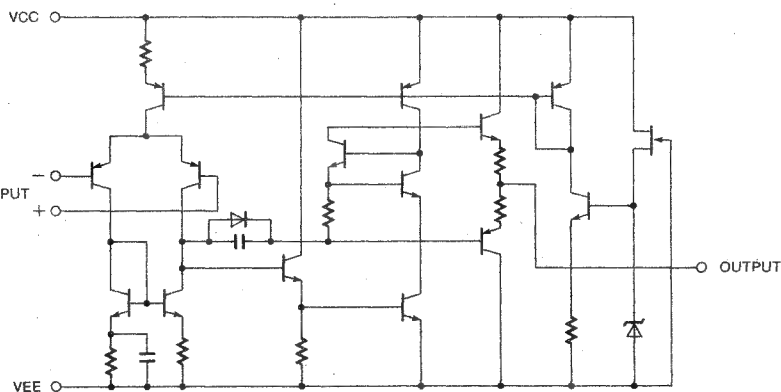
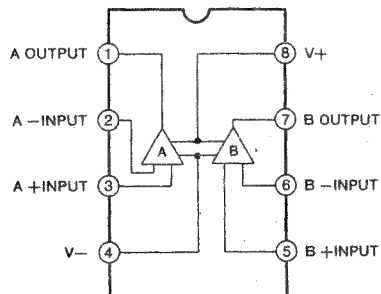
NJM4558M
(OPERATIONAL AMPLIFIER)
(TOP VIEW)



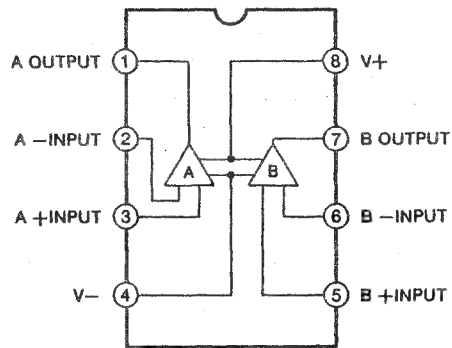
NJM4560MD
(OPERATIONAL AMPLIFIER)



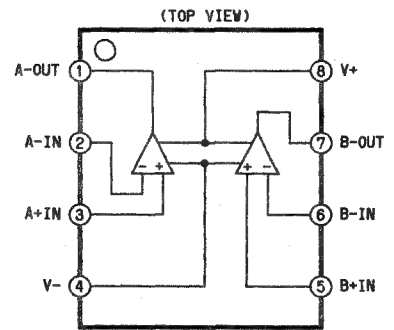
NJM4565MD
(DUAL OP AMP)
(TOP VIEW)



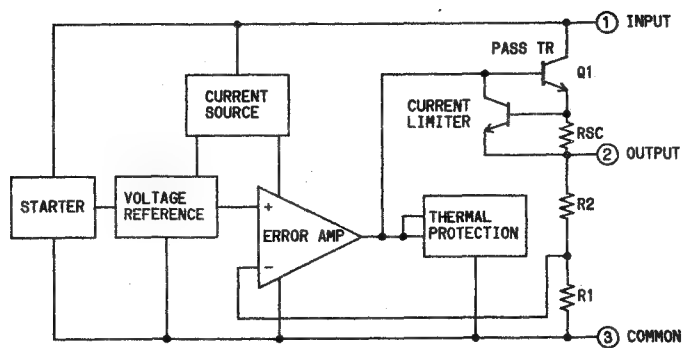
NJM4580ED
(DUAL OP AMP)



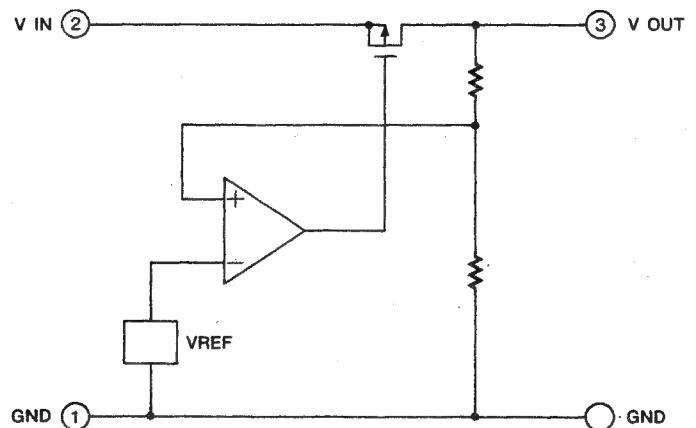
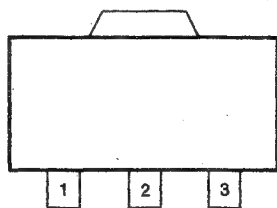
NJM5532MD
(2 CIRCUIT LOW NOISE AMP)



NJM78L05UA
(3-TERMINAL POSITIVE OUTPUT VOLTAGE REGULATOR)



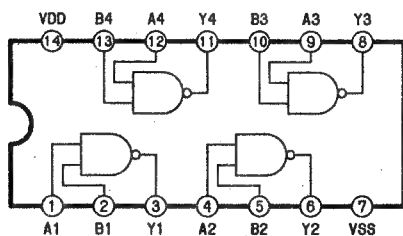
NJU7201U50
(OP AMP)



PC74HC00T

(QUAD 2-INPUT NAND GATE)

(TOP VIEW)



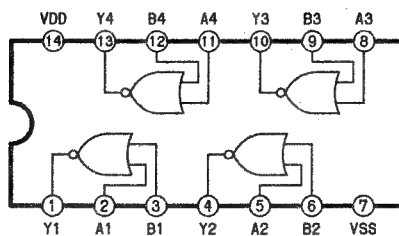
TRUTH TABLE (74HC)

INPUTS		OUTPUTS
A	B	Y
L	L	H
L	H	H
H	L	H
H	H	L

PC74HC02T

(QUAD 2-INPUT NOR GATE)

(TOP VIEW)



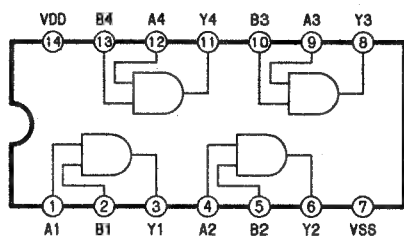
TRUTH TABLE

INPUTS		OUTPUTS
A	B	Y
L	L	H
L	H	L
H	L	L
H	H	L

PC74HC08T

(QUAD 2-INPUT AND GATE)

(TOP VIEW)



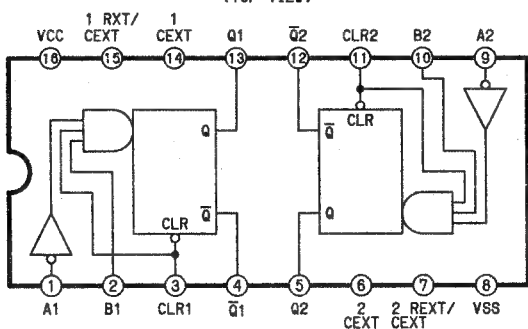
TRUTH TABLE

INPUTS		OUTPUTS
A	B	Y
L	L	L
L	H	L
H	L	L
H	H	H

PC74HC123T

(DUAL RETRIGGERABLE MONOSTABLE MULTIVIBRATOR)

(TOP VIEW)

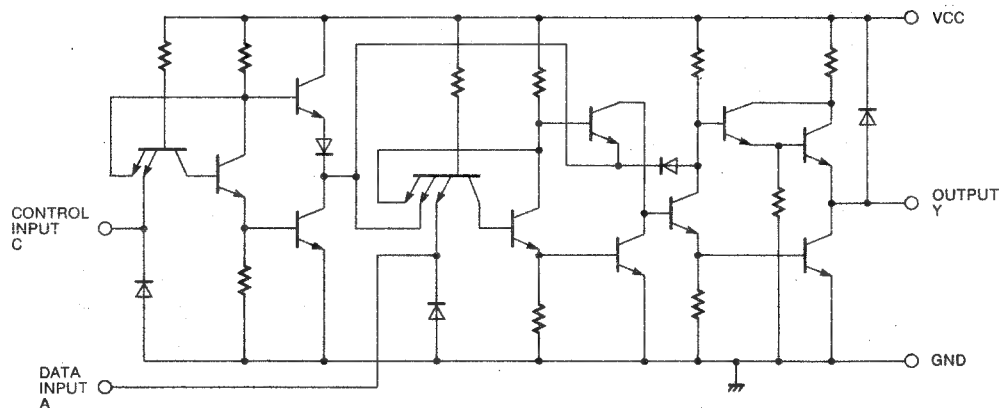
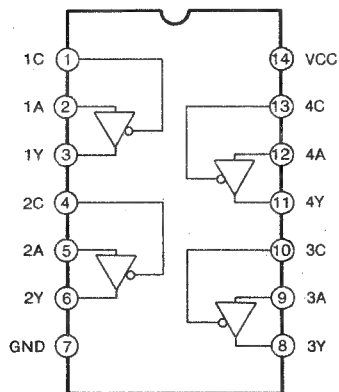


TRUTH TABLE

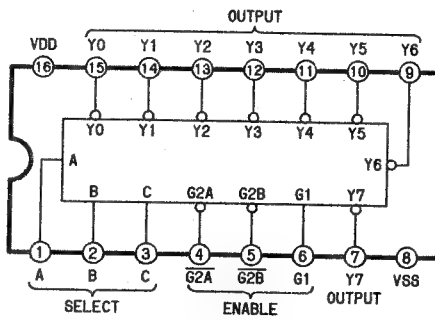
CLEAR	INPUTS		OUTPUTS	
	A	B	Q	\bar{Q}
L	x	x	L	H
x	H	x	L	H
x	x	L	L	H
H	L	↑	↓	↑
H	↓	H	↑	↓
↑	L	H	↑	↓

PC74HC125T

(QUAD 3 STATE BUS BUFFERS)



PC74HC138T
(3-TO-8 LINE DECODER)
(TOP VIEW)

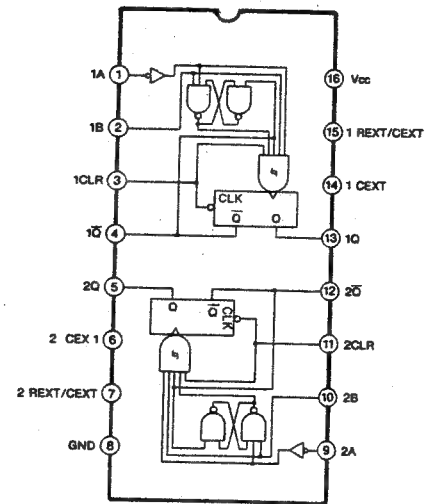


TRUTH TABLE (74HC138)

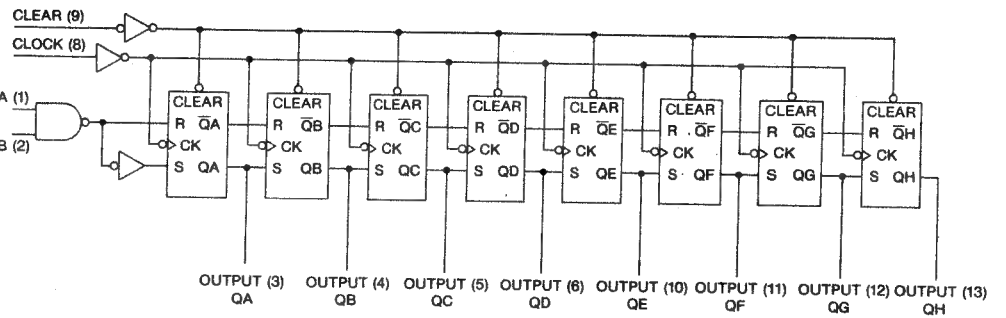
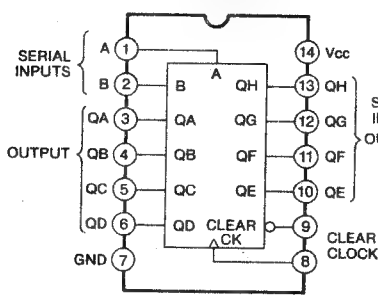
INPUTS		OUTPUTS							
ENABLE	SELECT								
G1 G2*	C B A	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
X H	X X X	H	H	H	H	H	H	H	H
L X	X X X	H	H	H	H	H	H	H	H
H L	L L L	L	H	H	H	H	H	H	H
H L	L L H	H	L	H	H	H	H	H	H
H L	L H L	H	H	L	H	H	H	H	H
H L	L H H	H	H	H	L	H	H	H	H
H L	H L L	H	H	H	H	L	H	H	H
H L	H L H	H	H	H	H	H	L	H	H
H L	H H L	H	H	H	H	H	H	L	H
H L	H H H	H	H	H	H	H	H	H	L

* $G2 = G2A + G2B$

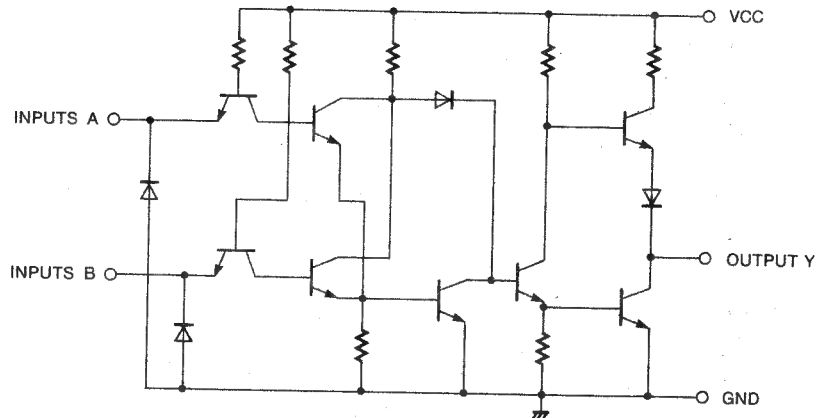
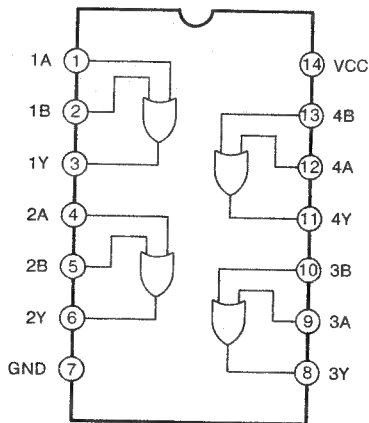
PC74HC221T
(DUAL SINGLE SHOT)



PC74HC164T
(8 BIT SHIFT REGISTER)



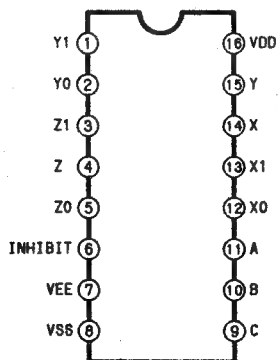
PC74HC32T
(QUAD 2 INPUT OR)



PC74HC4053T

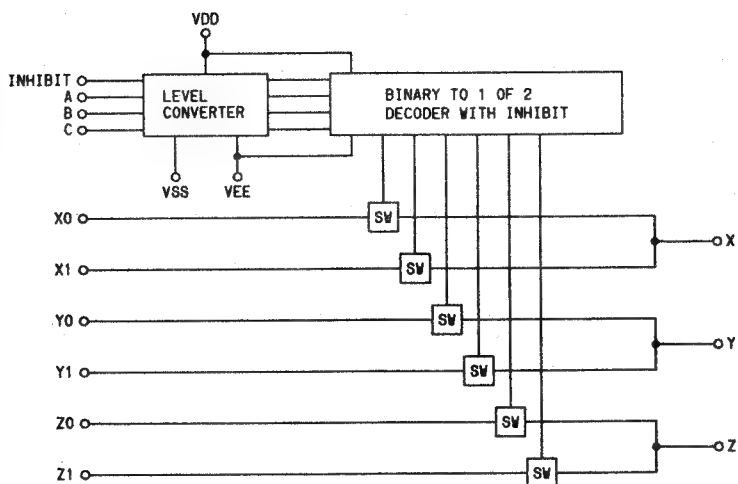
(TRIPLE 2-CHANNEL
MULTIPLEXER/DEMULTIPLEXER)

(TOP VIEW)



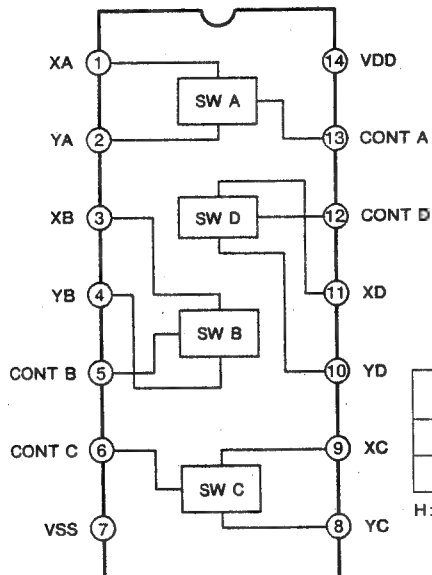
TRUTH TABLE

INPUT STATES				*ON* CHANNEL(S)
INHIBIT	C	B	A	
0	0	0	0	X0, Y0, Z0
0	0	0	1	X1, Y1, Z1
1	X	X	X	NONE



PC74HC4066T

(QUAD BILATERAL SWITCH)

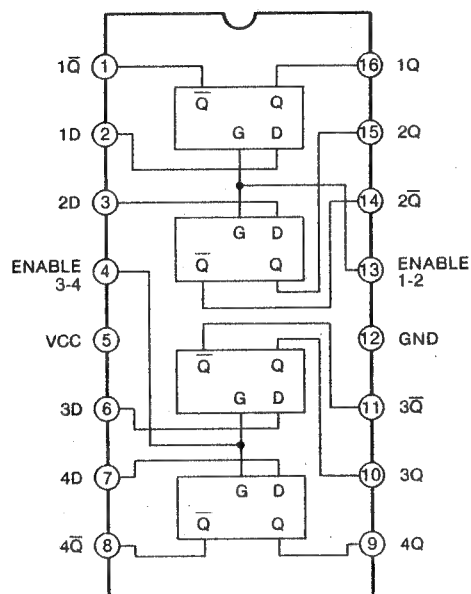


INPUT CONTROL (A,B,C,D)	SW FUNCTION
H	ON
L	OFF

H: HIGH LEVEL, L: LOW LEVEL

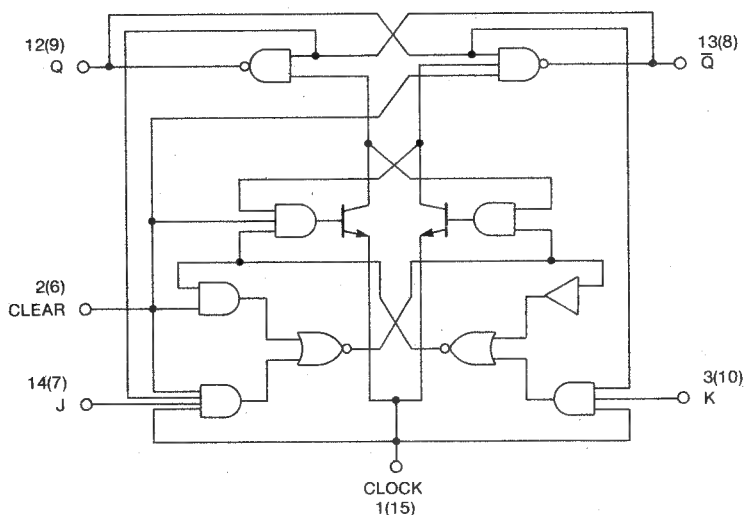
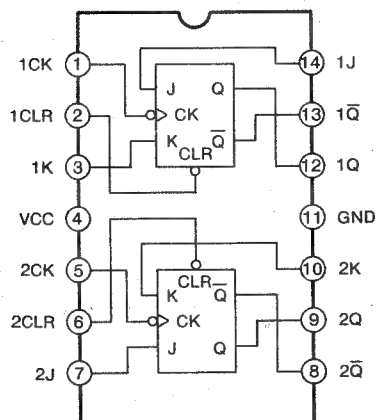
PC74HC75T

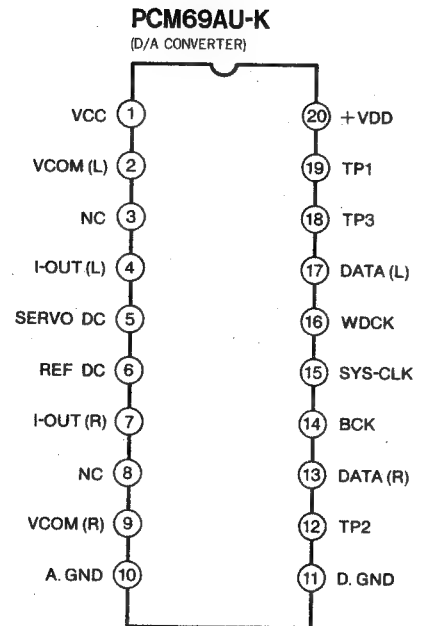
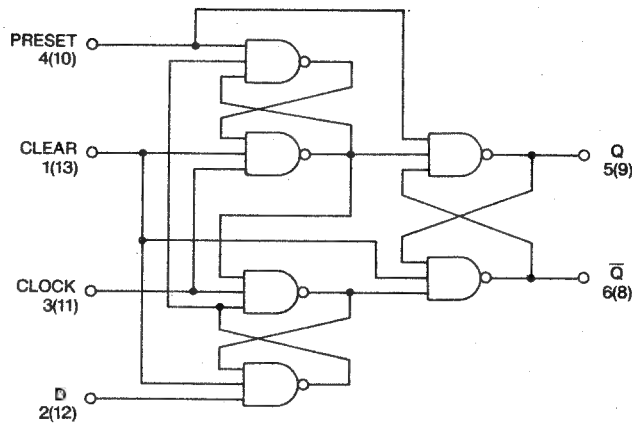
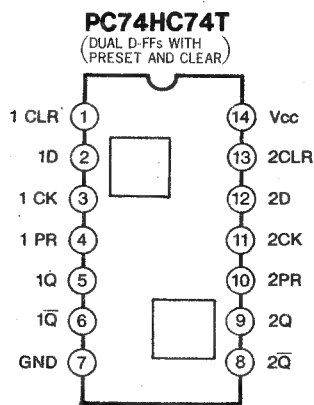
(4-BIT LATCHES)



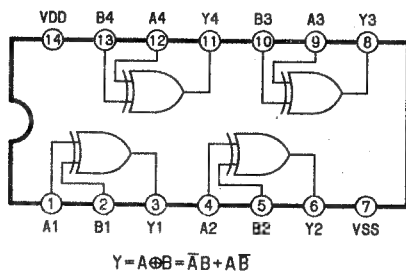
PC74HC73T

(DUAL JK-FFs WITH CLEAR)





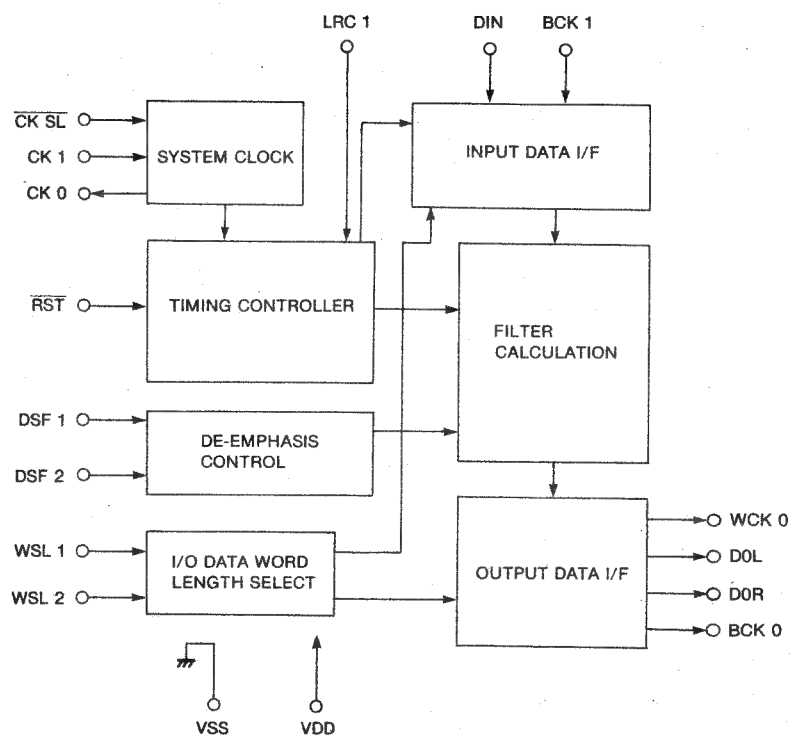
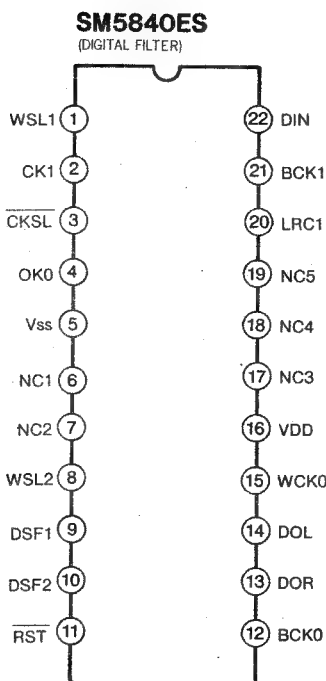
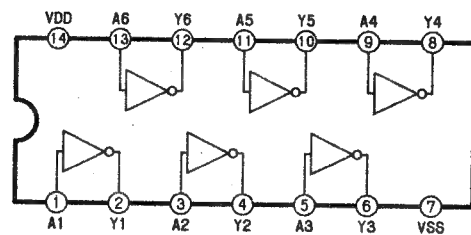
PC74HC86T
(QUAD EXCLUSIVE OR GATE)
(TOP VIEW)



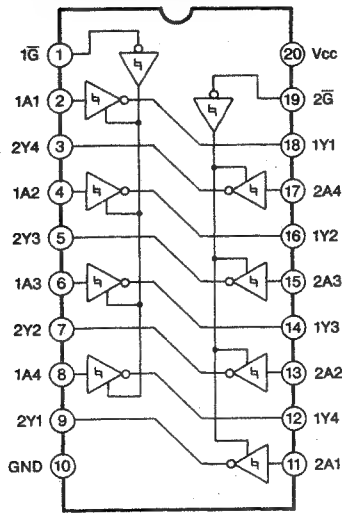
TRUTH TABLE

INPUTS		OUTPUTS
A	B	Y
L	L	L
L	H	H
H	L	H
H	H	L

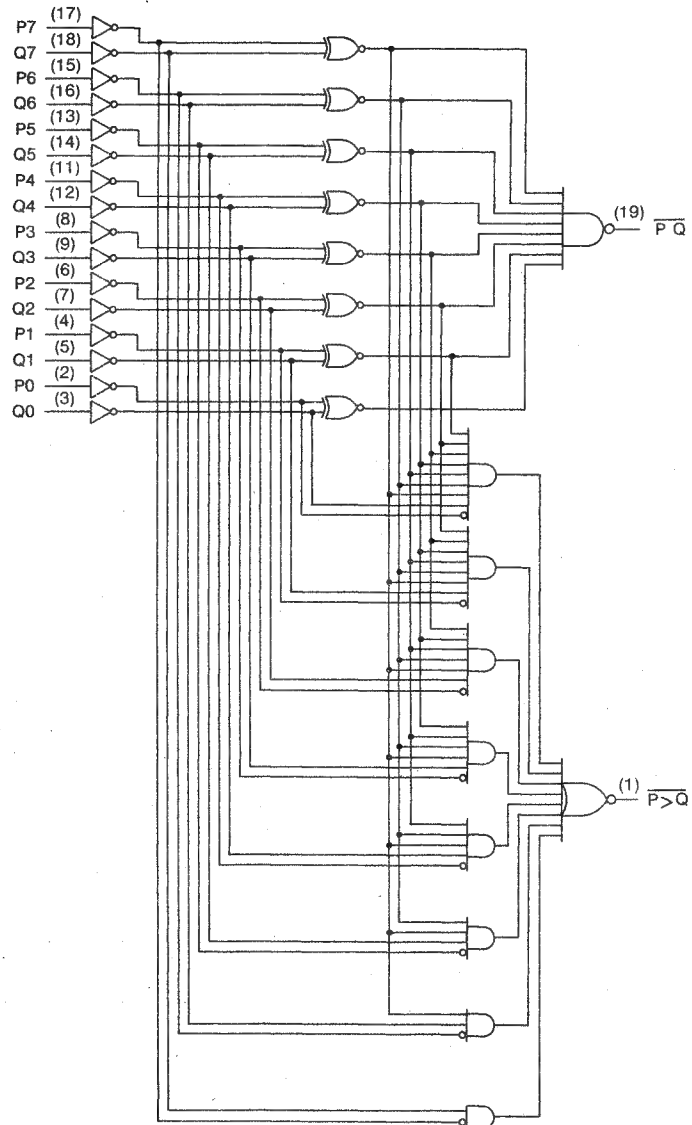
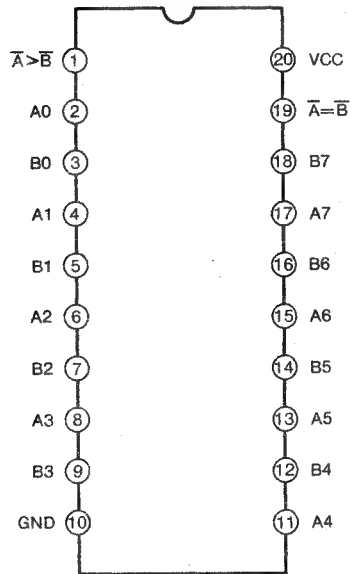
TC74HC04NS
(HEX. INVERTER)
(TOP VIEW)



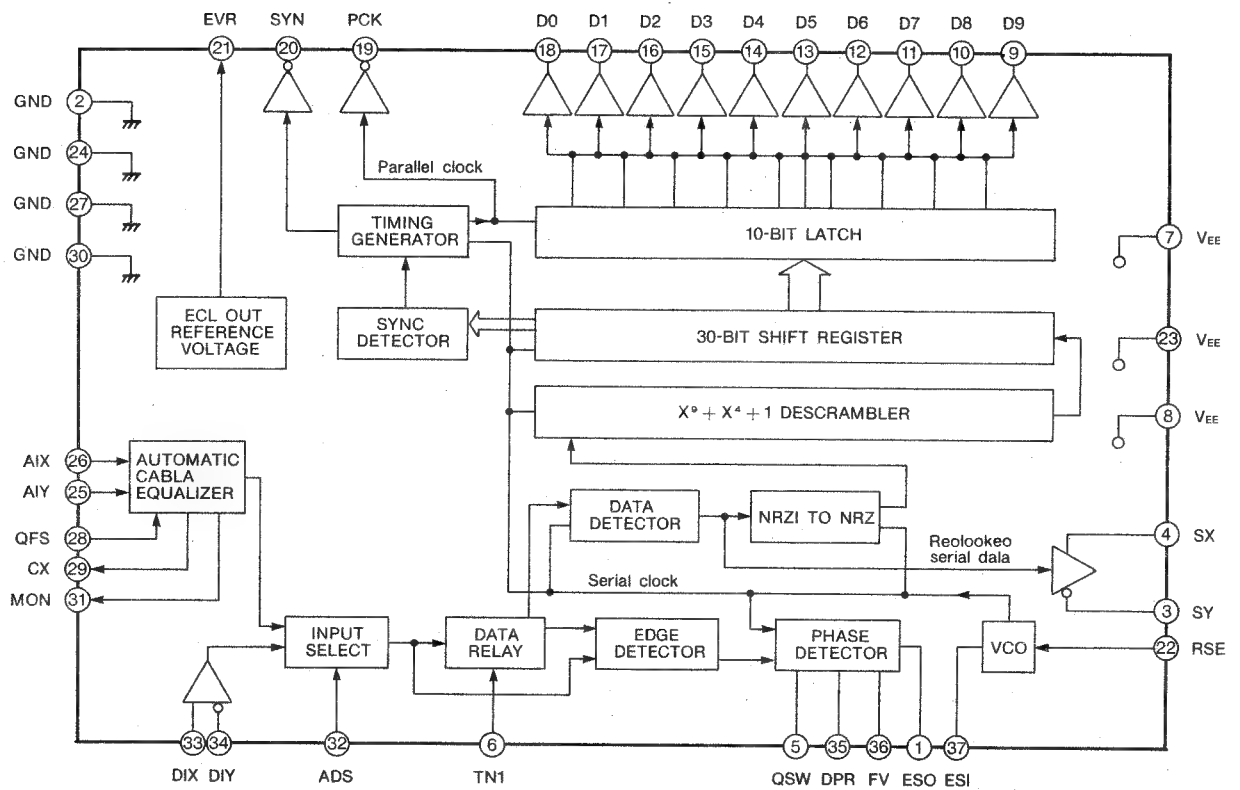
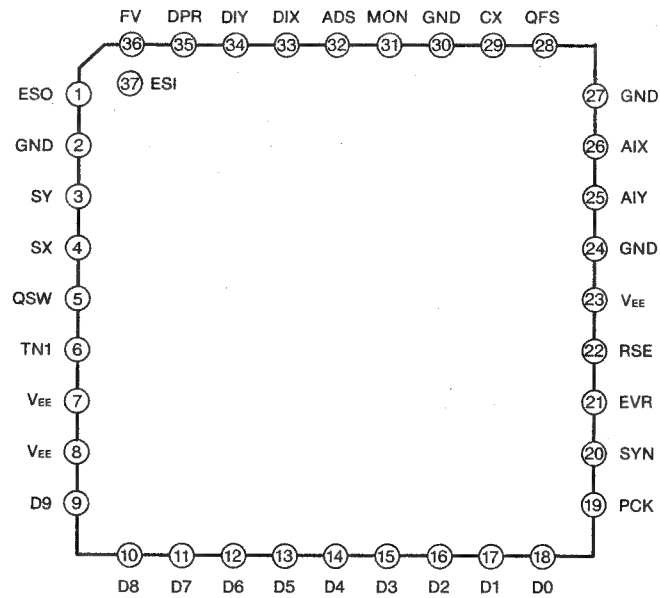
SM74AS240NS
(OLTLAL 3-STATE INVERTERS)



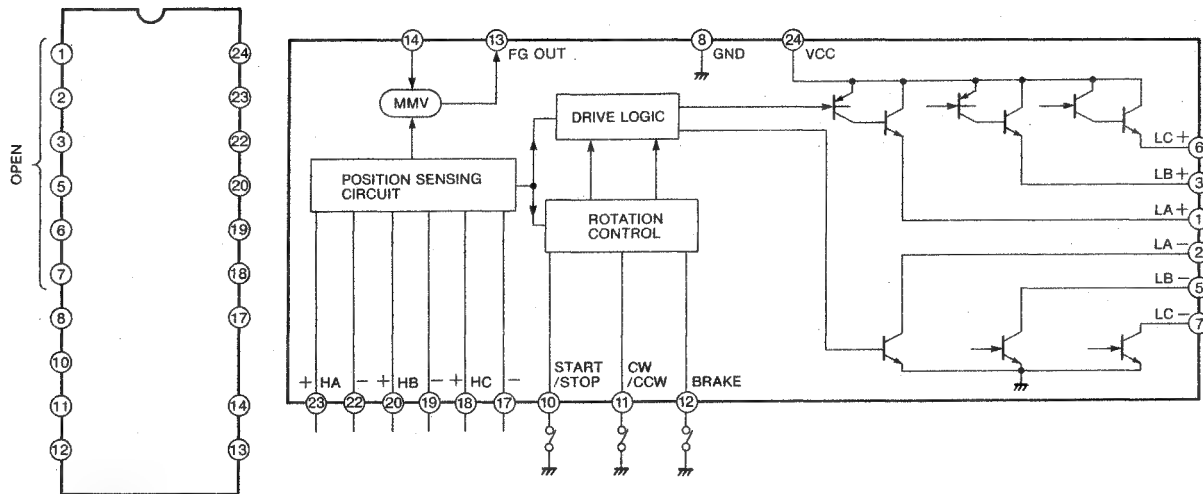
SN74LS682NS
(8-BIT MAGNITUDE COMPARATOR)



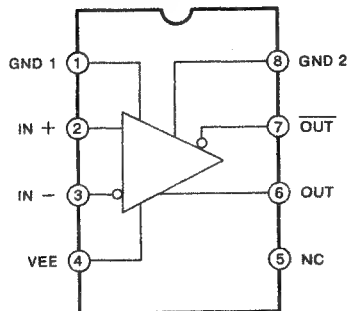
STV1602A
(SERIAL INTERFACE TRANSMISSION DECODER)



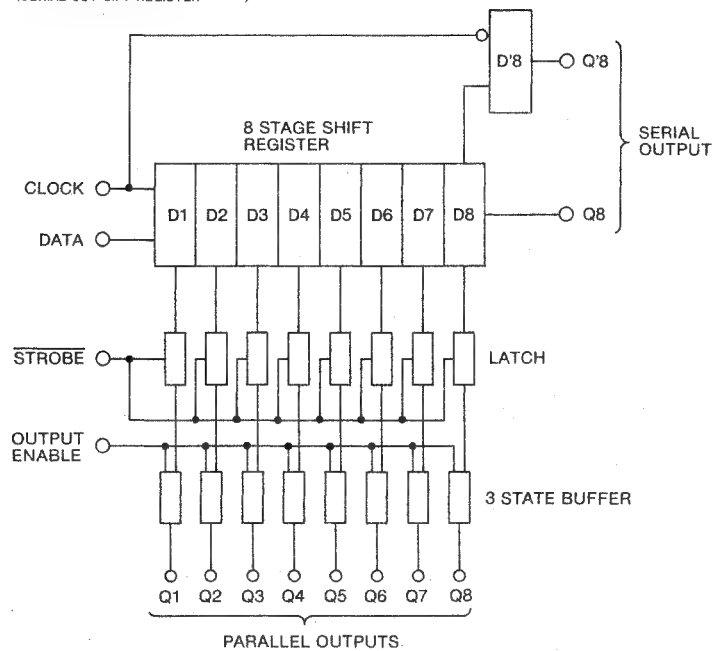
TA7712F
(MOTOR CONTROL)



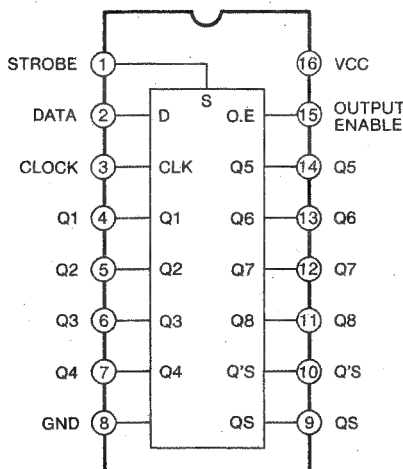
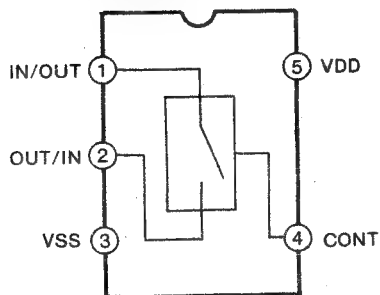
TA8504F
(COMPARATOR)



TC74HC4094AF
(8-STAGE SERIAL IN/PARALLEL OUT)
(SERIAL OUT SHIFT REGISTER)

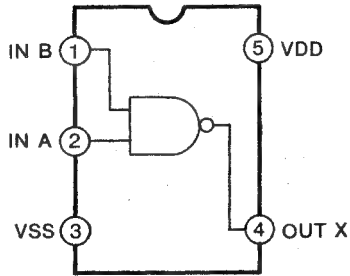


TC4S66F
(BILATERAL SWITCH)

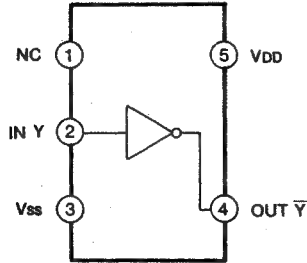


CLOCK	OUTPUT ENABLE	STROBE	DATA	PARALLEL OUTPUT		SERIAL OUTPUT	
				Q _i	Q _n	Q _s ⁺	Q _s
	L	X	X	High IMPEDANCE	High IMPEDANCE	D ₇	NO CHANGE
	L	X	X	High IMPEDANCE	High IMPEDANCE	NO CHANGE	D ₆
	H	L**	X	NO CHANGE	NO CHANGE	D ₇	NO CHANGE
	H	H	L	L	Q _{n-1}	D ₇	NO CHANGE
	H	H	H	H	Q _{n-1}	D ₇	NO CHANGE
	H	H	H	NO CHANGE	NO CHANGE	NO CHANGE	D ₆

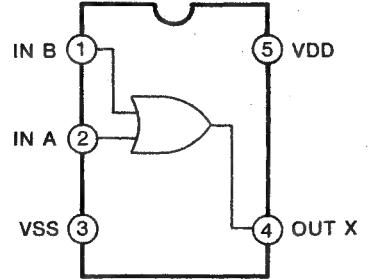
TC7S00F
(NAND GATE)



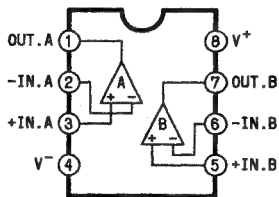
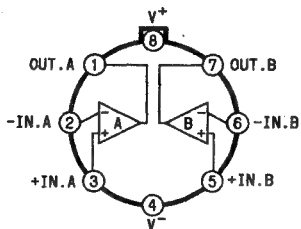
TC7S04F
(C-MOS INVERTER)



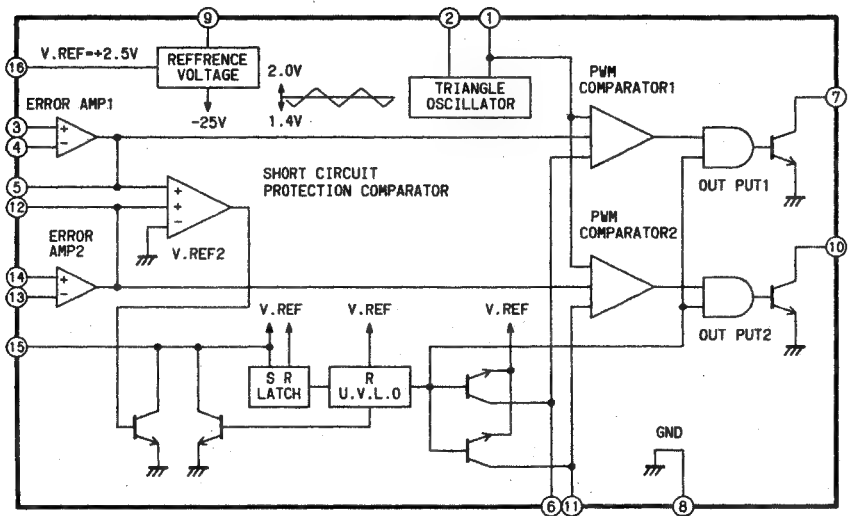
TC7S32F
(OR GATE)



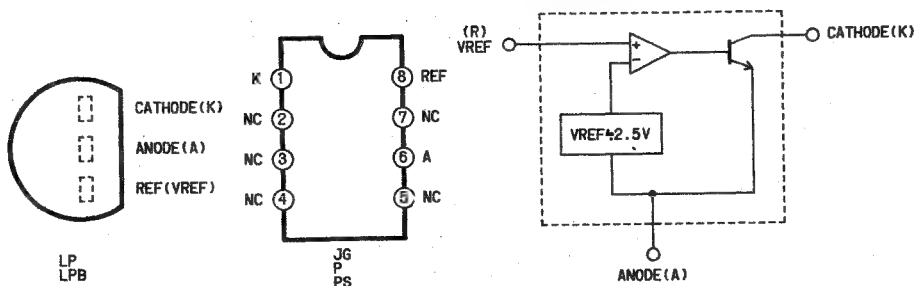
TL082CPS
(OPERATIONAL AMPLIFIER)
(TOP VIEW)



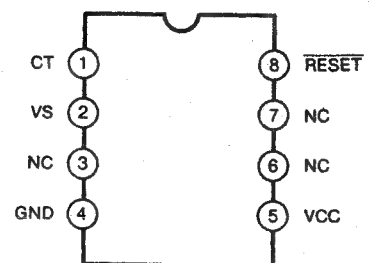
TL1451CNS
(DUAL SWITCHING REGULATOR CONTROLLER)



TL431CLP
(ADJUSTABLE PRECISION SHUNT REGULATOR)

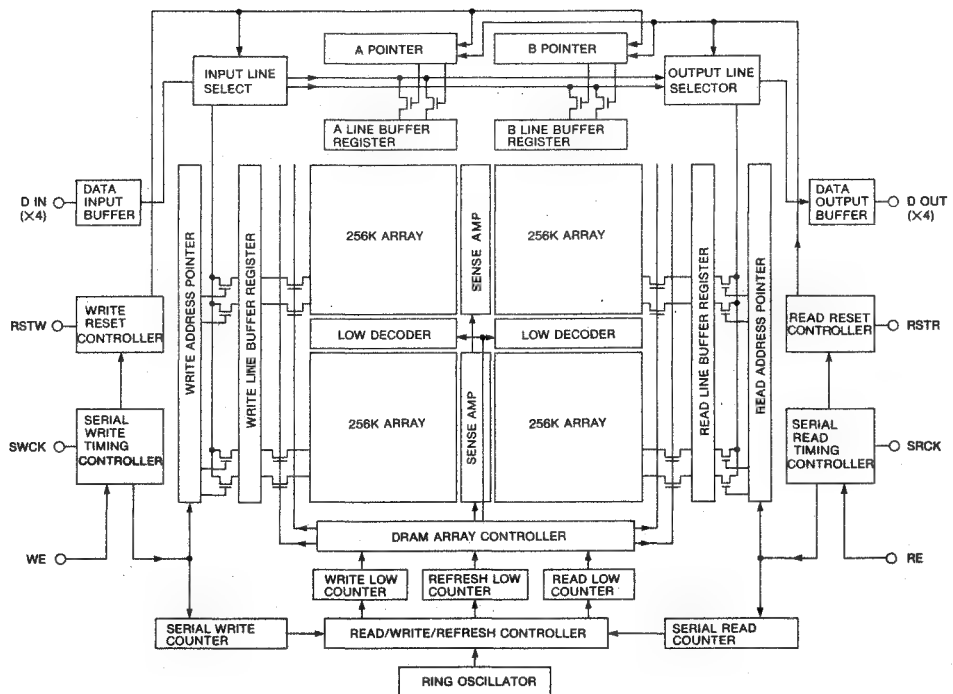
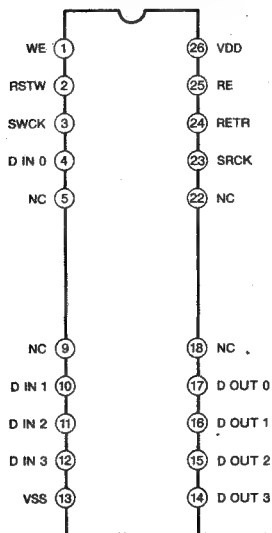


TL7700CPS



TMS4C1060D3L

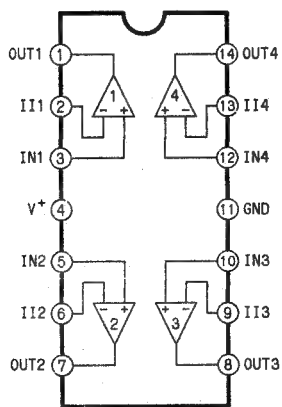
(1M BIT MEMORY)



μPC4741G2

(OPERATIONAL AMPLIFIER)

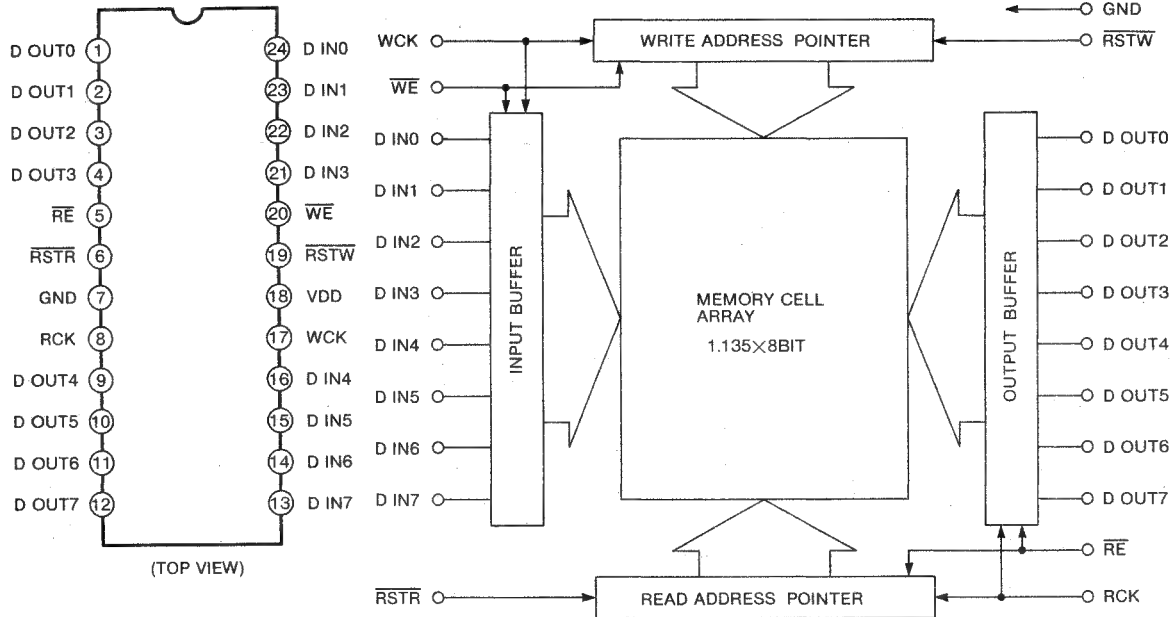
(TOP VIEW)



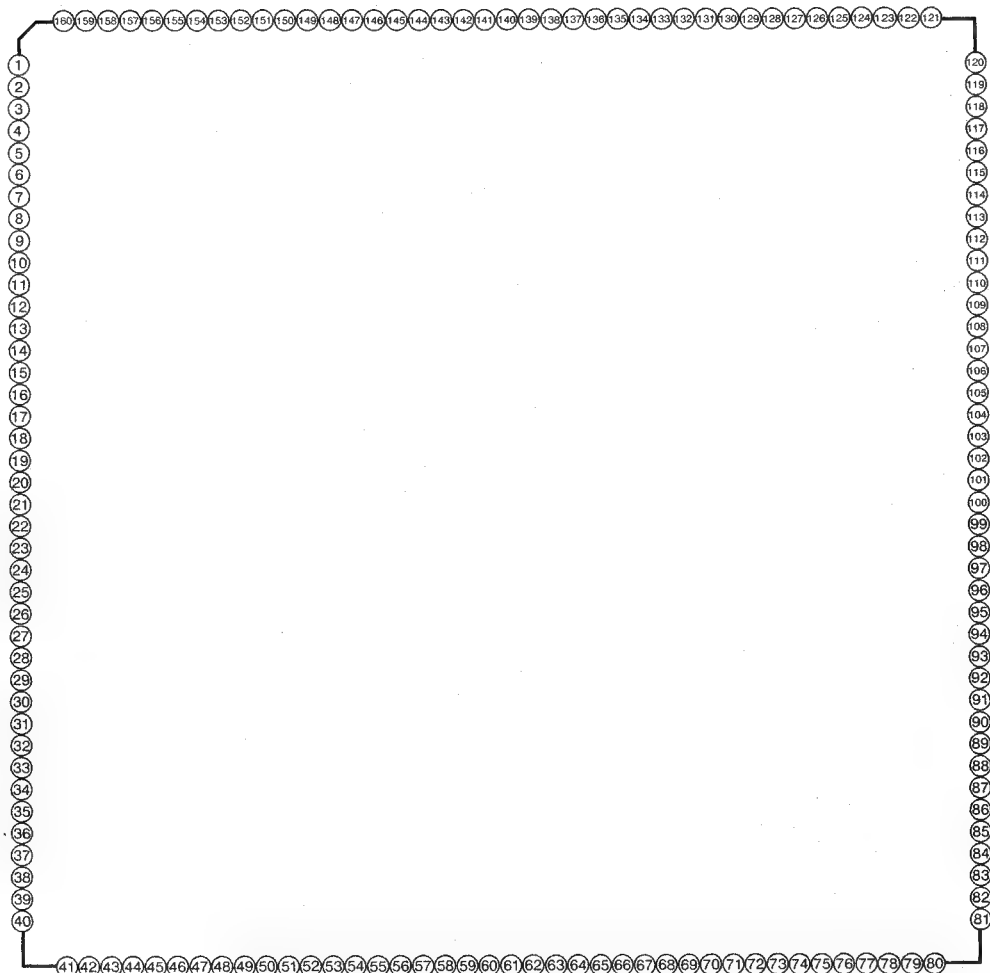
μPD42102G-3

(HIGH SPEED LINE BUFFER)

(TOP VIEW)

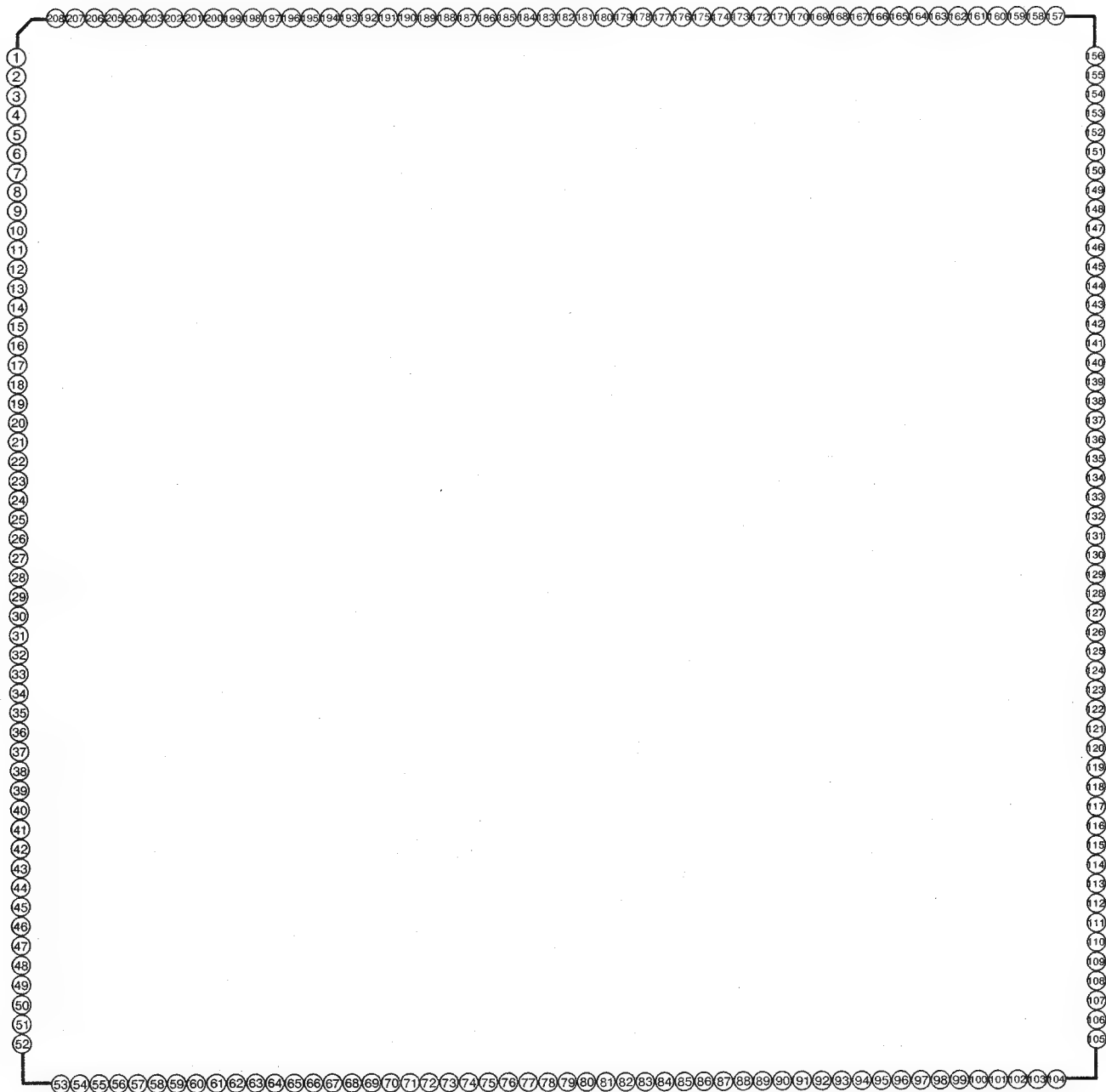


μPD65240G057
(106 PIN QFP) (GATE ARRAY)



PIN NO.	PIN NAME	PIN NO.	PIN NAME	PIN NO.	PIN NAME	PIN NO.	PIN NAME
1	VDD	41	GND	81	VDD	121	GND
2	P2	42	GND	82	P82	122	GND
3	P03	43	P43	83	P83	123	I23
4	P04	44	P44	84	P84	124	I24
5	P05	45	P45	85	P85	125	I25
6	P06	46	P46	86	P86	126	I26
7	P07	47	P47	87	P87	127	I27
8	P08	48	P48	88	P88	128	I28
9	P09	49	P49	89	P89	129	I29
10	P10	50	P50	90	P90	130	I30
11	P11	51	P51	91	P91	131	I31
12	P12	52	P52	92	GND	132	I32
13	P13	53	P53	93	P93	133	I33
14	P14	54	P54	94	P94	134	I34
15	P15	55	P55	95	P95	135	I35
16	P16	56	P56	96	P96	136	I36
17	P17	57	P57	97	P97	137	I37
18	P18	58	P58	98	P98	138	I38
19	P19	59	P59	99	P99	139	I39
20	VDD	60	P60	100	VDD	140	VDD
21	GND	61	P61	101	GND	141	I41
22	P22	62	P62	102	I02	142	I42
23	P23	63	P63	103	I03	143	I43
24	P24	64	VDD	104	I04	144	I44
25	P25	65	P65	105	I05	145	I45
26	P26	66	P66	106	I06	146	I46
27	P27	67	P67	107	I07	147	I47
28	P28	68	P68	108	I08	148	I48
29	P29	69	P69	109	I09	149	P149
30	P30	70	P70	110	GND	150	P150
31	P31	71	P71	111	I11	151	I51
32	P32	72	P72	112	I12	152	I52
33	P33	73	P73	113	I13	153	I53
34	P34	74	P74	114	I14	154	I54
35	P35	75	P75	115	I15	155	I55
36	P36	76	P76	116	I16	156	I56
37	P37	77	P77	117	I17	157	I57
38	P38	78	P78	118	I18	158	I58
39	P39	79	GND	119	I19	159	GND
40	VDD	80	GND	120	VDD	160	GND

μPD65664G039
(208 PIN QFP) (GATE ARRAY)

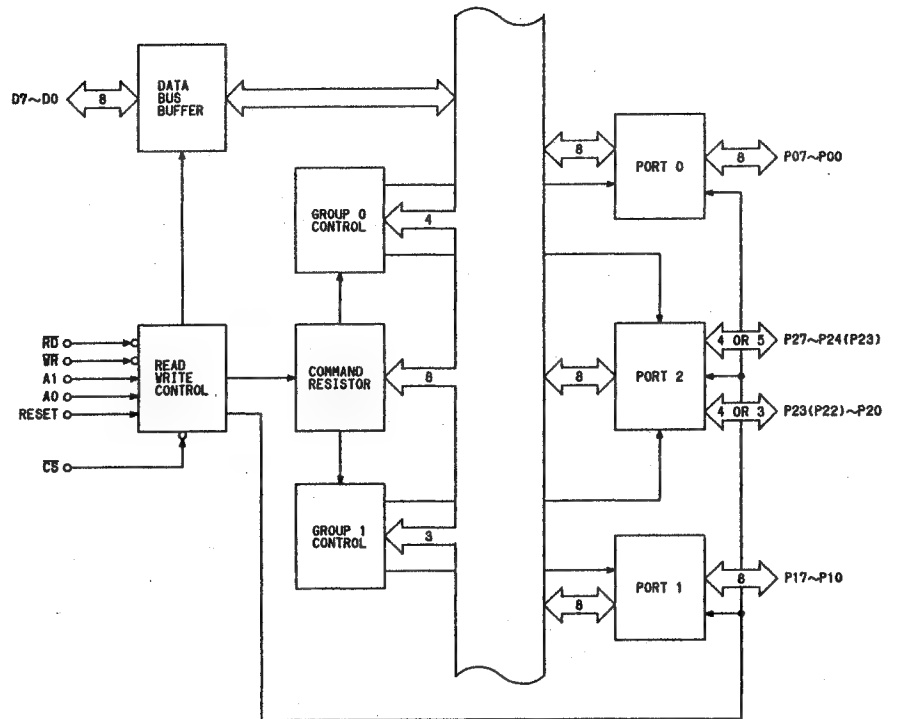
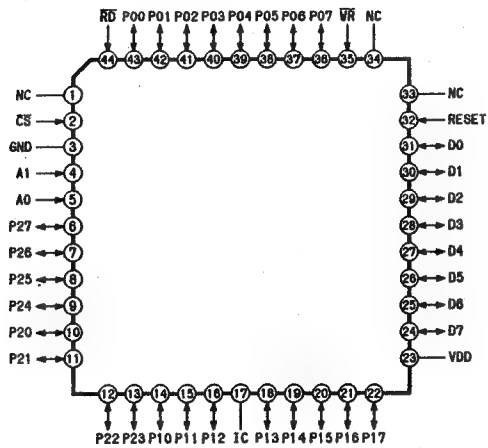


uPD65664GD-039

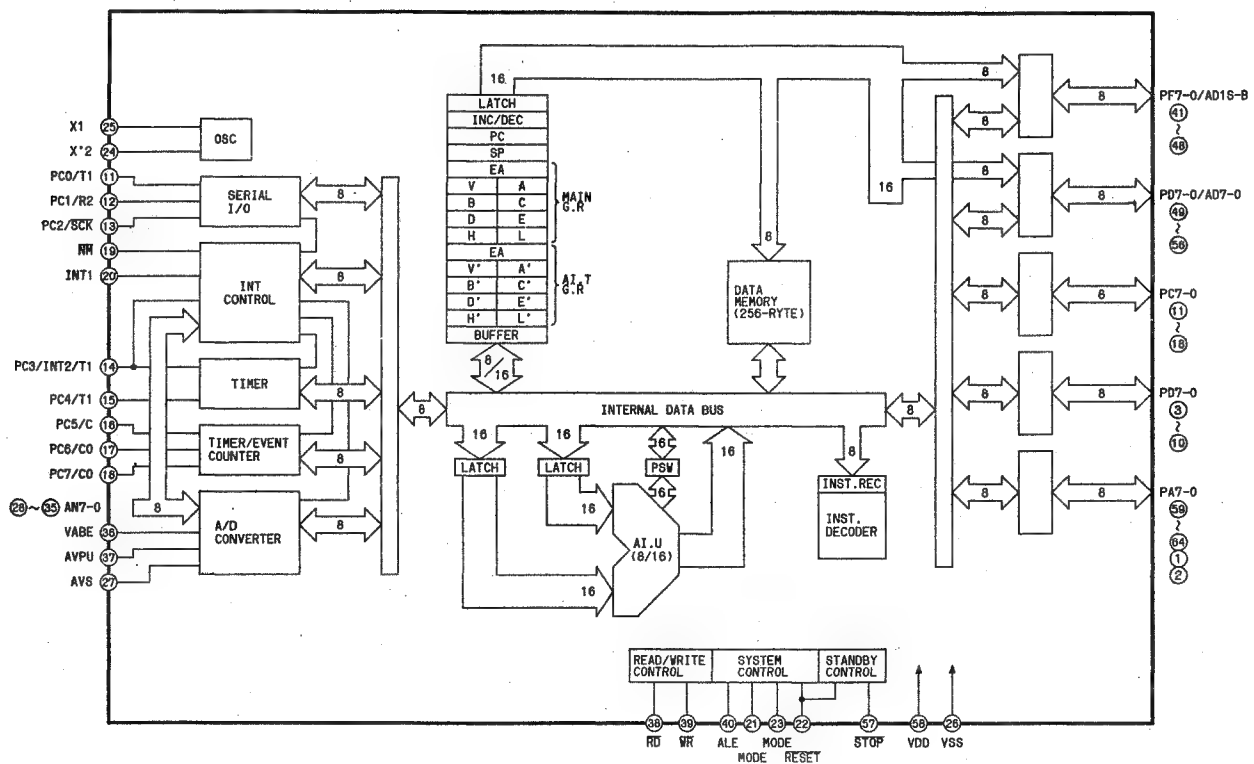
PIN NO.	PIN NAME	PIN NO.	PIN NAME	PIN NO.	PIN NAME	PIN NO.	PIN NAME
1	GND	41	AA7	81	EE7	121	BB0
2	GND	42	AA8	82	EE8	122	BB1
3	WCK1	43	AA9	83	EE9	123	BB2
4	DD5	44	A10	84	E10	124	BB3
5	DD6	45	A11	85	E11	125	BB4
6	DD7	46	A12	86	E12	126	BB5
7	DD8	47	AUG0	87	E13	127	BB6
8	DD9	48	FRM0	88	E14	128	BB7
9	D10	49	CST0	89	E15	129	BB8
10	D11	50	WCK0	90	E16	130	VDD
11	D12	51	GND	91	E17	131	GND
12	D13	52	GND	92	GND	132	BB9
13	D14	53	VDD	93	S02	133	B10
14	D15	54	FLG0	94	W02	134	B11
15	D16	55	DA07	95	FWE	135	B12
16	AUG1	56	DA06	96	CC0	136	B13
17	FRM1	57	DA05	97	CC1	137	B14
18	CST1	58	DA04	98	CC2	138	B15
19	FLG1	59	DA03	99	CC3	139	B16
20	DA17	60	DA02	100	CC4	140	SDAT
21	DA16	61	DA01	101	CC5	141	SCLK
22	DA15	62	DA00	102	CC6	142	SRLD
23	DA14	63	GND	103	CC7	143	B17
24	DA13	64	A13	104	VDD	144	S10
25	DA12	65	A14	105	GND	145	W10
26	GND	66	A15	106	GND	146	FWB
27	VDD	67	A16	107	CC8	147	PBN
28	DA11	68	A17	108	CC9	148	RF0
29	DA10	69	S00	109	C10	149	RF1
30	D17	70	W00	110	C11	150	RF2
31	S11	71	FWA	111	C12	151	EEF0
32	W11	72	EEO	112	C13	152	EEF1
33	FWD	73	EE1	113	C14	153	EEF2
34	AA0	74	EE2	114	C15	154	FDP1
35	AA1	75	EE3	115	C16	155	GND
36	AA2	76	EE4	116	C17	156	GND
37	AA3	77	EE5	117	S01	157	VDD
38	AA4	78	VDD	118	W01	158	OE
39	AA5	79	GND	119	FWC	159	TEST
40	AA6	80	EE6	120	GND	160	SCAN

PIN NO.	PIN NAME	PIN NO.	PIN NAME	PIN NO.	PIN NAME	PIN NO.	PIN NAME
161	FSC4	173	R00	185	FF7	197	S12
162	GND	174	FRD	186	FF8	198	W12
163	FF0	175	FF4	187	FF9	199	FWF
164	FF1	176	FF5	188	F10	200	DD0
165	FF2	177	SYF2	189	F11	201	DD1
166	FF3	178	SYF1	190	F12	202	DD2
167	RM2	179	SYF0	191	F13	203	DD3
168	RM1	180	RFDN	192	F14	204	DD4
169	RMO	181	RHSN	193	F15	205	PBF2
170	OCS	182	GND	194	GND	206	PBF1
171	OFS	183	VDD	195	F16	207	PBF0
172	CFS	184	FF6	196	F17	208	VDD

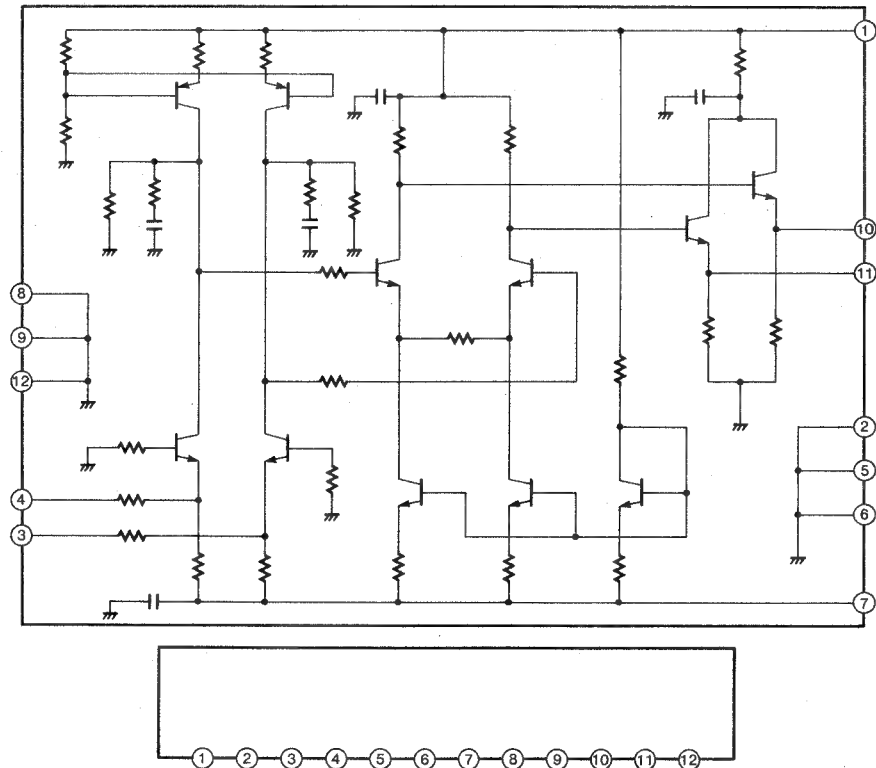
μPD71055GB
(PARALLEL INTERFACE UNIT)



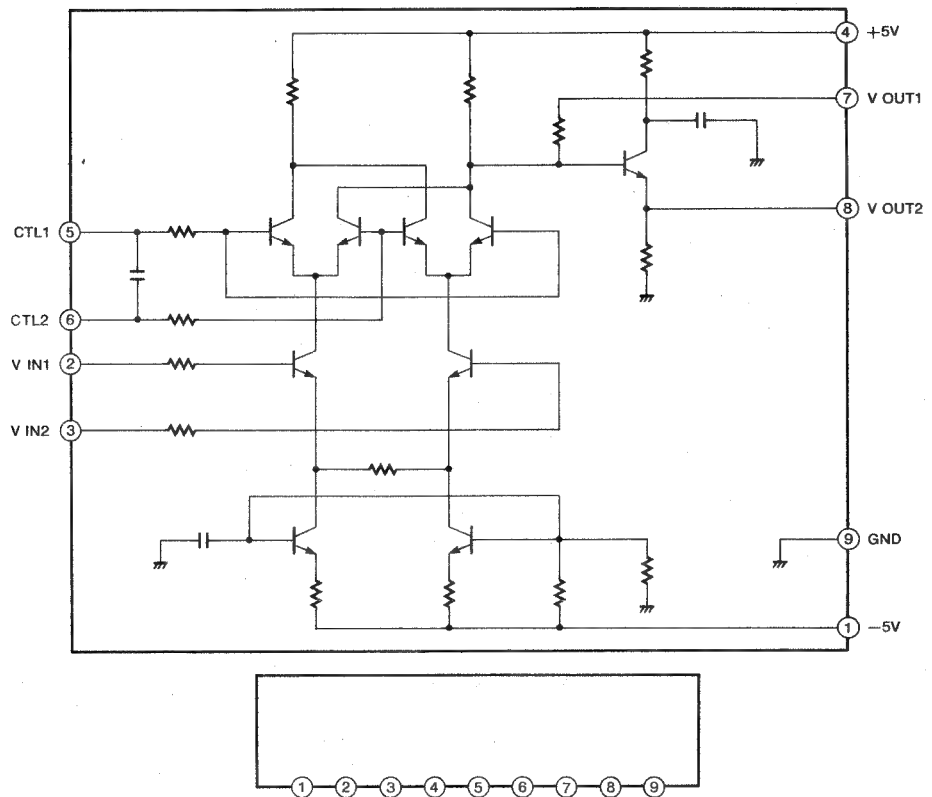
μPD78C10GF
(8-BIT MICRO COMPUTER)



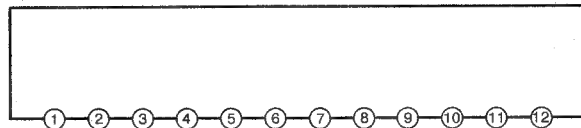
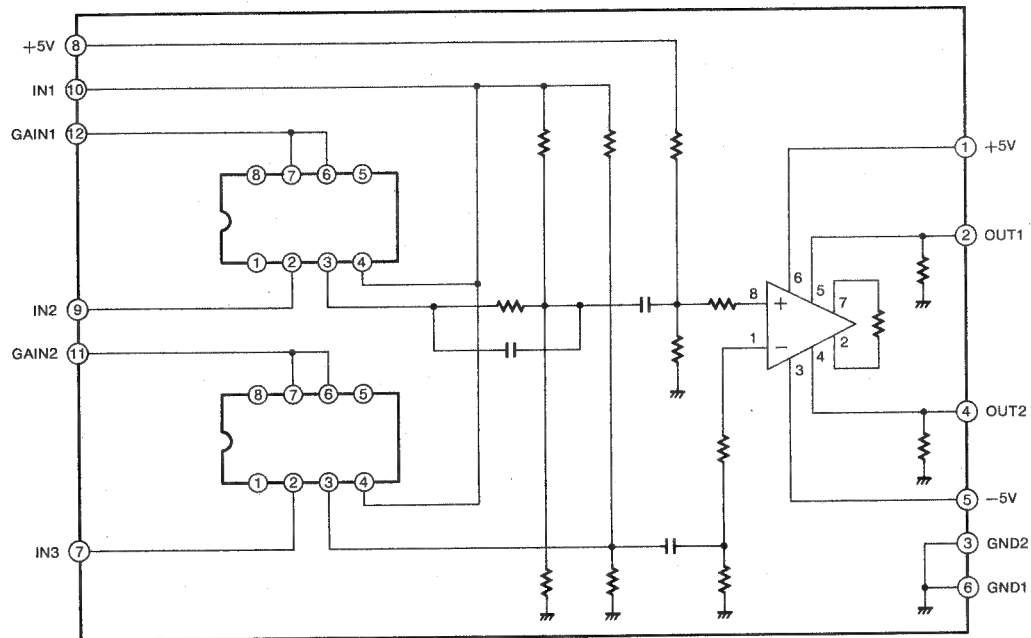
VCRO350
(INTEGRAL AMP)



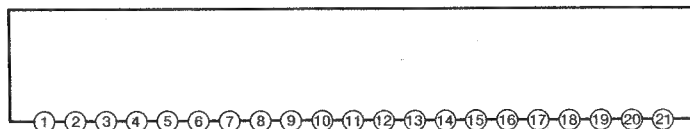
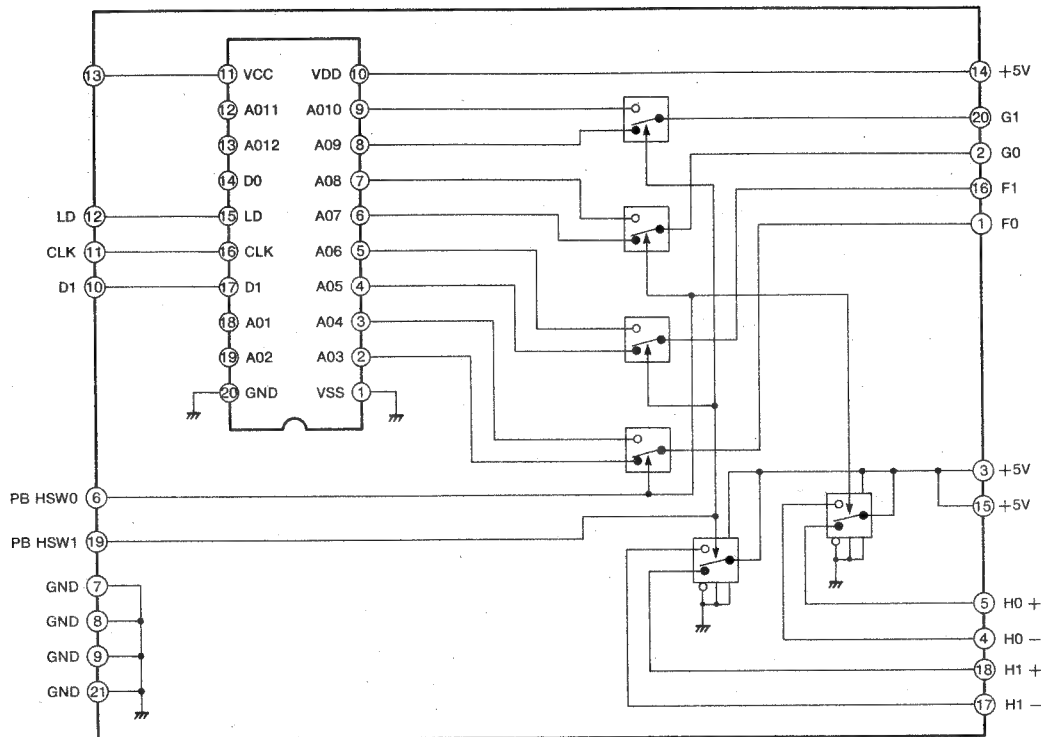
VCRO351
(EQUALIZER)



VCR0352
(EQUALIZER)

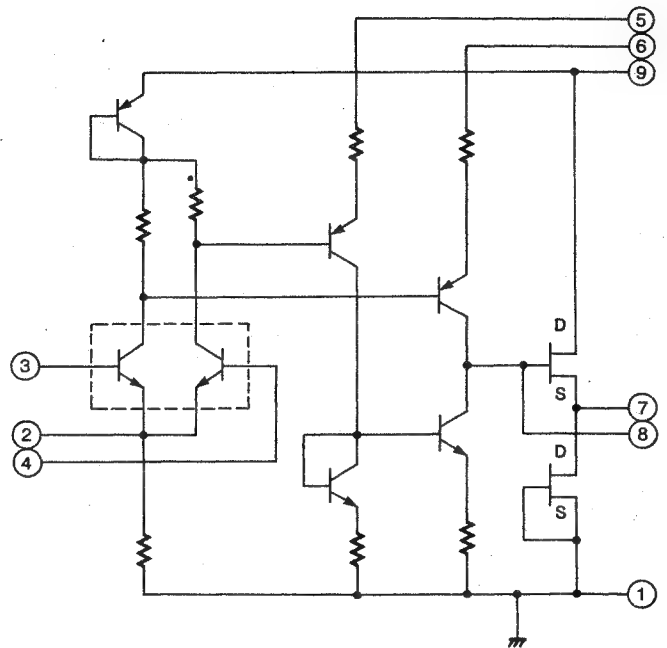
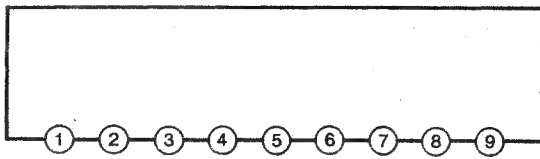


VCR0353
(D/A CONVERTER)



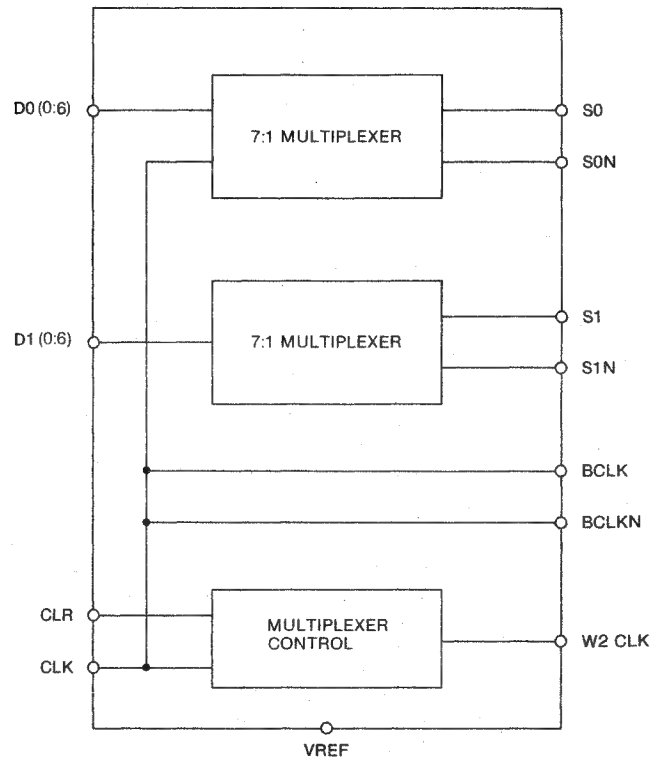
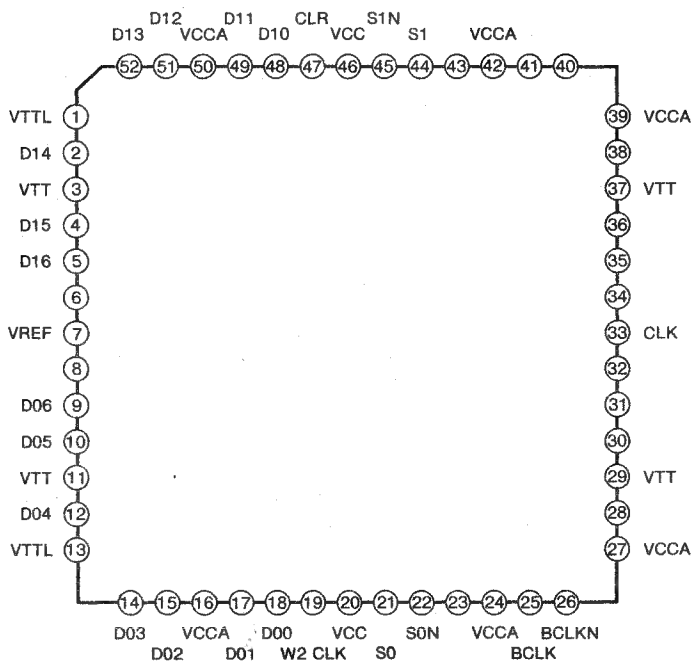
VCR0354

(PHASE COMPORATOR)

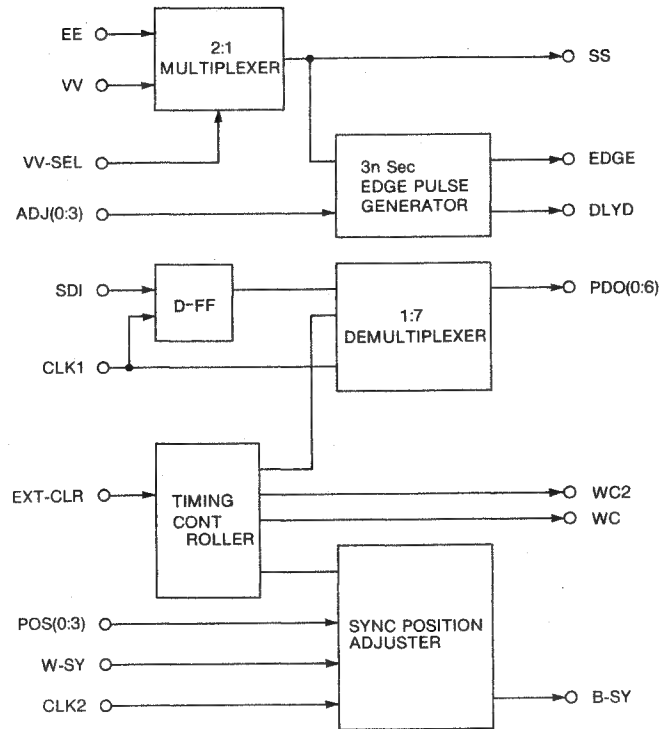
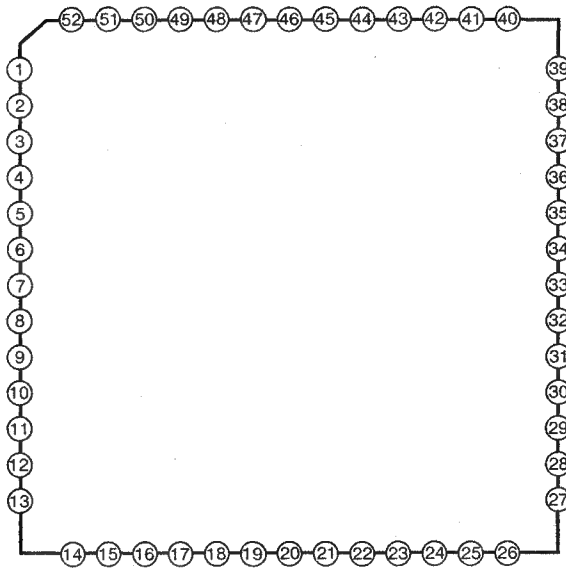


VSC3KI007FL

(140MHz 7 BIT PARALLEL SERIAL CONVERTER)



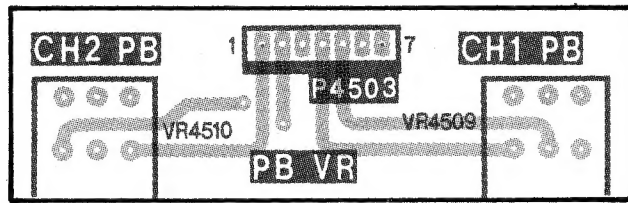
VSC3KI128FL
(140MHz MULTIPLEXER)



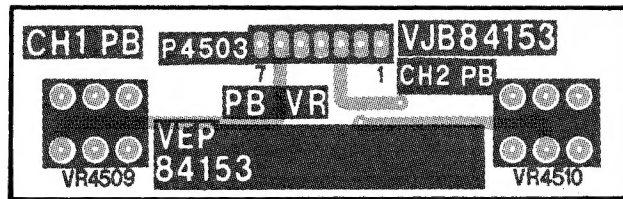
PIN NAME	PIN NO.
ADJ3	2
EE-P	4
EE-N	5
ADJ2	6
ADJ1	8
VV-P	9
VV-N	10
ADJ0	12
SS-P	14
SS-N	15
VV-SEL	17
EDGE	18
DLYD	19
B-SY-P	21
B-SY-N	22
W-SY	26
POS3	28
POS2	30
POS1	31
POS0	32
CLK	33
SDI	34
CLR	35
OE	36
PD06	38
PD05	40
PD04	41
PD03	43
PD02	44
PD01	45
PD00	47
WC2	48
WC	49
WC-P	51
WC-N	52

POWER PIN	PIN NO.
V _{TT}	3, 11, 29, 37
V _{CC}	20, 46
V _{CCA}	16, 24, 42, 50
V _{TTL}	1, 13, 27, 39
V _{rat}	7
* NC	23, 25

PB VR P.C.BOARD(VEP84153A)

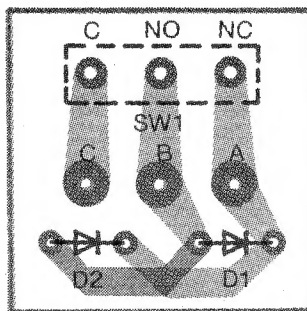


(COMPONENT SIDE)



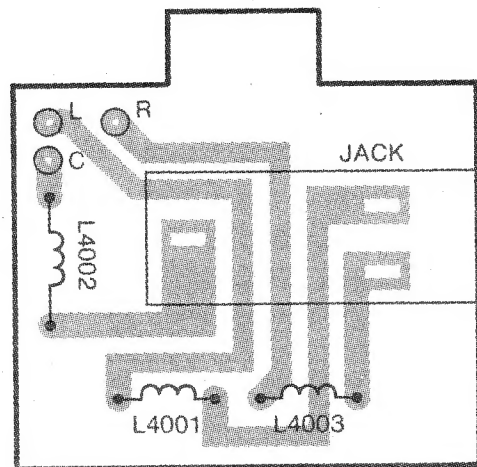
(FOIL SIDE)

DC INPUT SW P.C.BOARD(VEP80750B)



(COMPONENT SIDE)

HEA PHONE JACK P.C.BOARD(VEP80388A)



(FOIL SIDE)

Service Manual

Electrical Parts List

Note:

1. *Be sure to make your orders of replacement parts according to this list.
2. Unless otherwise specified, all resistors are in OHMS, K=1,000
OHMS, all capacitors are in MICROFARADS (μ F), P= $\mu\mu$ F.
3. The P.C. Board units marked with "■" shown below the main assembled parts.
4. The parts marked with (E) on the exploded view show the electric parts.
5. IMPORTANT SAFETY NOTICE
Components identified with the mark < ! > have the special characteristics for safety.
When replacing any of these components, use only the same type.

< <Abbreviations for part> >

<NAME> >

<DESCRIPTIONS>

C. CAPACITOR	:	CERAMIC CAPACITOR
C. CAPACITOR	CH :	CERAMIC CHIP CAPACITOR
E. CAPACITOR	:	ELECTROLYTIC CAPACITOR
G. CAPACITOR	:	GLASS CAPACITOR
M. CAPACITOR	:	MICA CAPACITOR
P. CAPACITOR	:	PLASTIC FILM CAPACITOR
S. CAPACITOR	:	SEMI-CONDUCTOR CAPACITOR
T. CAPACITOR	:	TANTALUM CAPACITOR
TRIMMER	:	TRIMMER
C. RESISTOR	:	CARBON RESISTOR
F. RESISTOR	:	FUSE RESISTOR
M. RESISTOR	:	METAL OXIDE RESISTOR
M. RESISTOR	CH :	METAL OXIDE CHIP RESISTOR
S. RESISTOR	:	SOLID RESISTOR
V. RESISTOR	:	VARIABLE RESISTOR
W. RESISTOR	:	WIRE WOUND RESISTOR
COMBI. TR-R	:	TRANSISTOR-RESISTOR COMBINATION PARTS
COMBI. R-R	:	RESISTOR-RESISTOR COMBINATION PARTS
COMBI. C-R	:	CAPACITOR-RESISTOR COMBINATION PARTS
COMBI. C-R-R	:	CAPACITOR-RESISTOR-COIL COMBINATION PARTS
P.C. BOARD	:	PRINTED CIRCUIT BOARD
W/COMPONENT	:	WITH COMPONENT

Service Manual

Supplement

D3 Video Product

Subject: Correction of Service Manual

Please use this supplement together with the Service Manual as follows:

Model No.	Bulletin No.	Order No.	Effective from
AJ-D320-P	-----	VQS0295	-----

MAINTENANCE AND MECHANICAL ADJUSTMENT PROCEDURES (Page : 2-1)

Part Number					
Ref. No.	Original Part No.	New Part No.	Part Name & Descriptions	Pcs	Remarks
2	VEG1034	VEG1055	Drum Unit	1	

MECHANICAL CHASSIS ASSEMBLY(1) (Page : PARTS-3)

Part Number					
Ref. No.	Original Part No.	New Part No.	Part Name & Descriptions	Pcs	Remarks
15	VEG1034	VEG1055	Drum Unit	1	

Technical Bulletin

Supplement to the Service Manual

Broadcast Product

Subject: Correction of Service Manual

Please use this supplement together with the Service Manual as follows:

Model No.	Bulletin No.	Order No.	Effective from
AJ-D320-E	-----	VQS0295	-----

MAINTENANCE AND MECHANICAL ADJUSTMENT PROCEDURES (Page : 2-1)

Part Number					
Ref. No.	Original Part No.	New Part No.	Part Name & Descriptions	Pcs	Remarks
2	VEG1033	VEG1054	Drum Unit	1	

MECHANICAL CHASSIS ASSEMBLY(1) (Page : PARTS-3)

Part Number					
Ref. No.	Original Part No.	New Part No.	Part Name & Descriptions	Pcs	Remarks
15	VEG1033	VEG1054	Drum Unit	1	